

AKAI

SERVICE MANUAL

Model:

LCT2785TA

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This manual is the latest at the time of printing, and does not include the modification which may be made after the printing, by the constant improvement of product.

1.Do not power on .

1.1 Please check AC cable if connect to AC plug.

Is true the connector don't connect to AC plug. Please connect it.

2.2 Please check AC cable if connect to AC power.

Is true the AC cable don't connect to AC power. Please connect it.

3.3 Please check power board of fuse if broken.

If the F1 fuse is broken, Please pull out the AC cable from AC power. Please check AC L power and AC N ground by multimeter, The read number is infinite, the fuse is broke. then look up power board if not burn out place. Is true it. Please change power board or be changed power board.

2. The power on switch of green extinguish.

2.1 The power of led(indicator light) is red light, To touch power on key when indicator light wink.

Is true that the power DC output have somewhere short circuit.

Please check connector J39,J31 .If not connector direction is wrong.

Or the mainboard somewhere of power short circuit.

3.The power is normal work ,but don't backlight.

3.1 The indicator light work normal (green light).

Please check Main board of transistor Q1&collect if not has +5v voltage.

Is true Q18 collect hasn't +5v ,To check Q18 if fail. Or to check Q18 of base if not low.

(Low is working, high don't work).

Please refer to attached sheet A circuit diagram.

3.2 Please check backlight of connector if not it direction is wrong or the connector of wire compositordirection is wrong.

3.3 To check connector panel of voltage is +24v. It's true .Then to check of the first pin if it have +5V voltage, It's true , than to check power board of +24v voltage ,It's true. The panel of backlight board is fail. The change panel of backlight board.

Please refer to attached sheet B Panel of datasheet.

4.The screen don't have picture But have backlight.

4.1 To check to panel of voltage ,To check main board of bead L69 and L57 connect if not OK.Then check the L69 and L57 of voltage is +12v(27 inch panel voltage is +5v, To check L68 and L56) . Next to check fuse F1 and connector J10 if not is +12v(27 inch panel voltage is +5v). If isn't please check power board of connector CON5 if has +12v(27 inch panel voltage is +5v).

4.2To check to main board +12 V voltage. To check to main board IC U35 of the first pin if

+5v voltage ,It's fail. It's low (close 0 v) working.

The circuit diagram follow down:

Please refer to attached sheet A circuit diagram.

5.The remote control don't be control.

6.1 The check batteries of remote control if it run out of .

6.2 To check main board of connector J21 of wire connect fastness and the connector of wire open.

Please refer to attached sheet A circuit diagram.

6.The sound don't output.

7.1 To check main board +24v voltage of connector J8 ,It's true not +24v voltage. Then to to check power main +24v fail .

Please refer to attached sheet A circuit diagram.

7.The DTV don't detect .

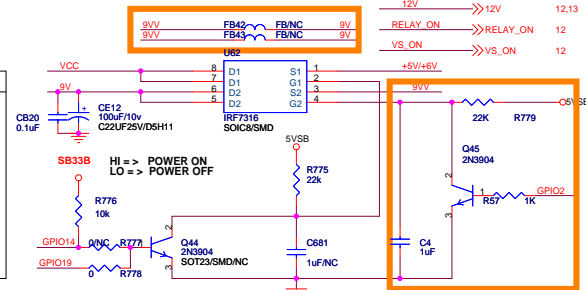
7.1 To check mainboard of connector J24 and DTV mainboard of connector HA1 of FCC wire if no connect fastness.

Please refer to attached sheet C of DTV circuit diagram.

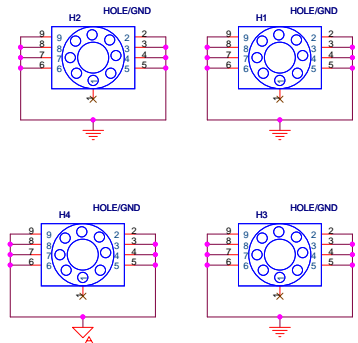
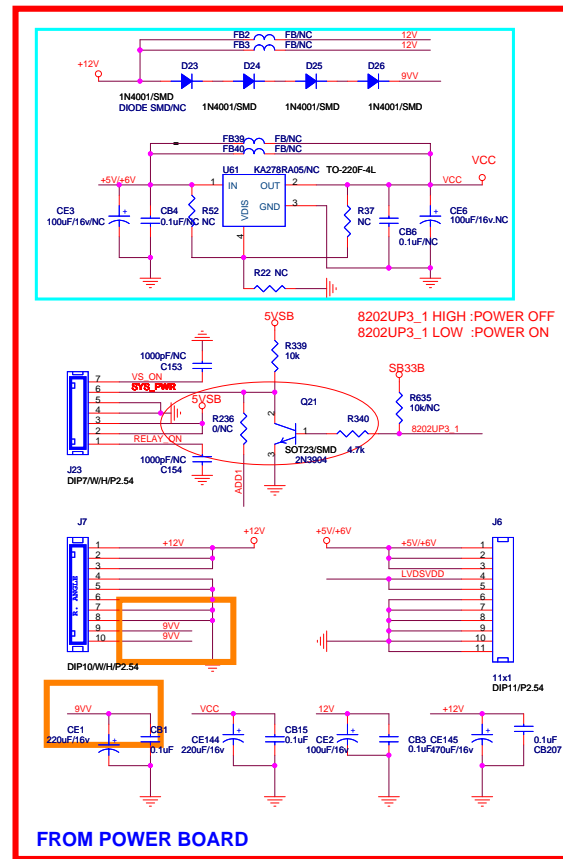
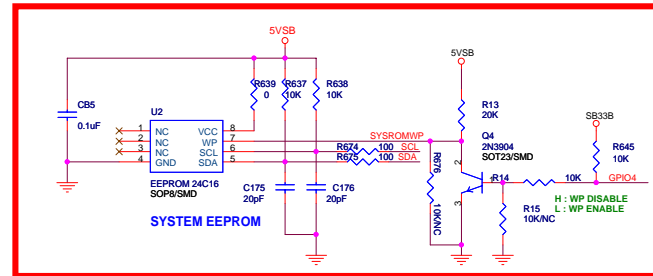
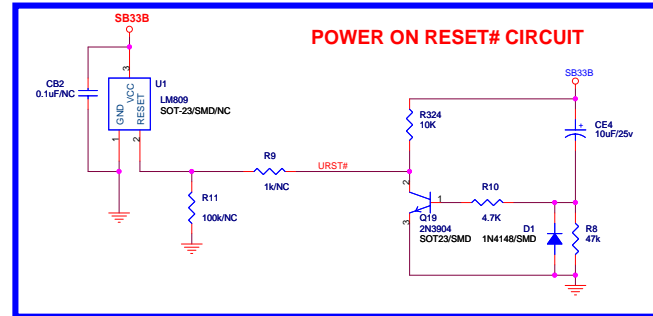
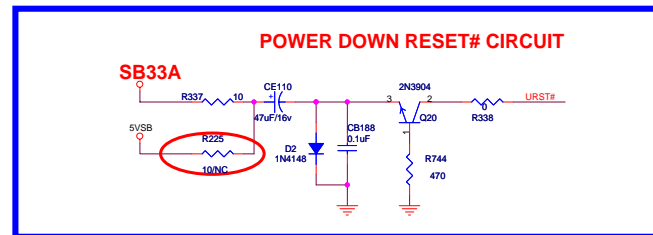
MT8202E (PBGA388) LCDTV BOARD 4 LAYERS FOR AKAI

1. INDEX / POWER / RESET / EEPROM
2. LDO
3. MT8202E PBGA388
4. MT8202 DECOUPLING
5. DDR MEMORY & FLASH
6. MT5351 INTERFACE
7. HDMI MT8293
8. DAUGHTER BOARD IN
9. WM8776 & VIDEO BYPASS
10. AUDIO / VIDEO IN CIRCUIT
11. VGA & PC AUDIO IN
12. LVDS OUT
13. BACK LIGHT / KEYPAD
14. TUNER IN
15. AV IN
16. AUDIO IN
17. AUDIO Amplifier

Rev	History	P#	Date
AKAI_MT8202_27US_LVDS_V0.0 AKAI_MT8202_27US_HDMI_LVDS_V0.0	New ADD HDMI / VIDEO / AUDIO CONNECTOR INPUT IN		2005/11/22



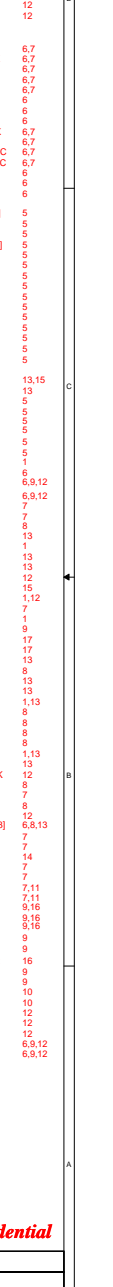
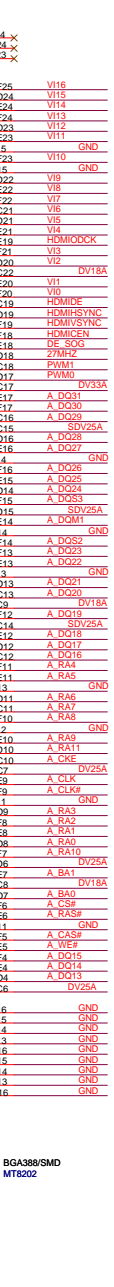
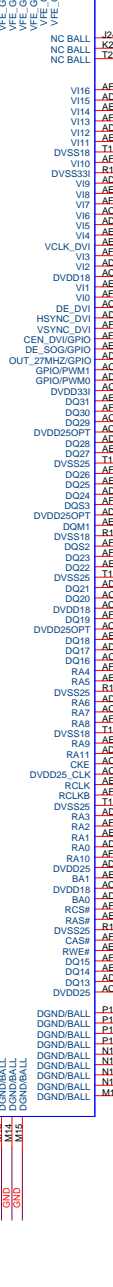
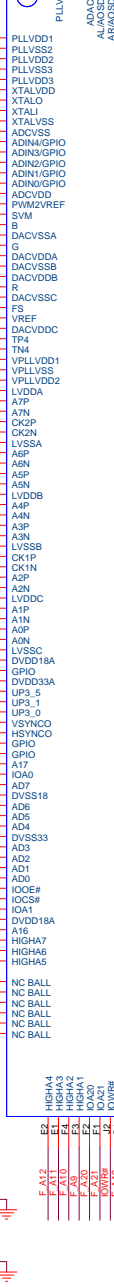
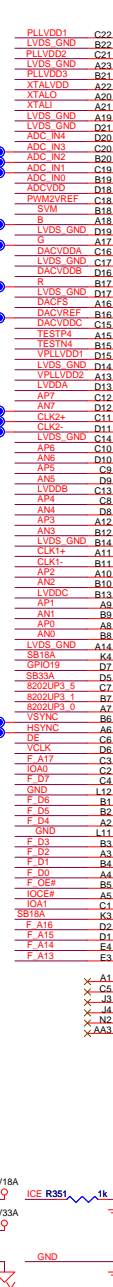
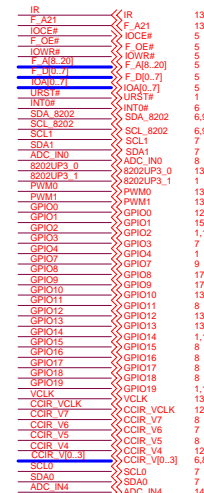
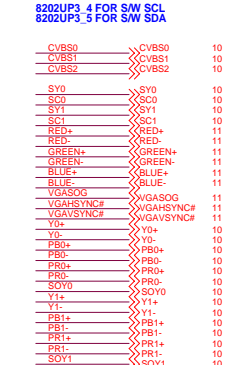
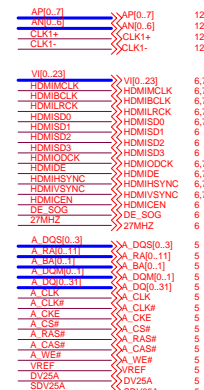
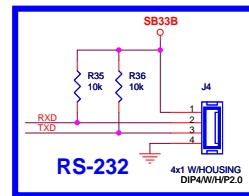
LVDSVDD	>>>LVDSGND	2,3,4
SCL	>>>SCL	9,14
SDA	>>>SDA	9,14
URST#	>>>URST#	3
8202UP3_1	>>>8202UP3_1	3
GPIO2	>>>GPIO2	3,12
GPIO4	>>>GPIO4	3
GPIO14	>>>GPIO14	3,13
GPIO19	>>>GPIO19	3,13
9V	>>>9V	7,9,14
12V	>>>12V	12,13
RELAY_ON	>>>RELAY_ON	12
VS_ON	>>>VS_ON	12



FROM POWER BOARD

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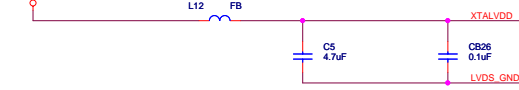
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Size C	Document Number AKAI_MT8202_27US_LVDS_V0.0	Checked 1	Rev 1
Date Thursday, April 13, 2006	Sheet 1	17	



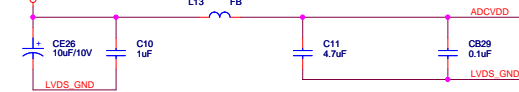
MT8202 SOCKET

STANDBY ANALOG POWER

ASB18A

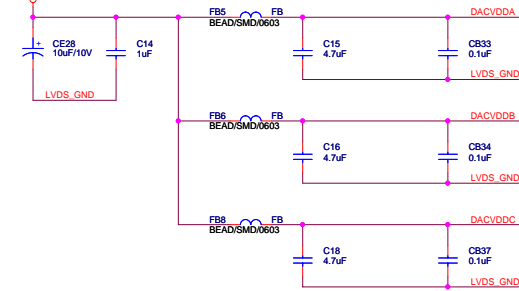


ASB33A



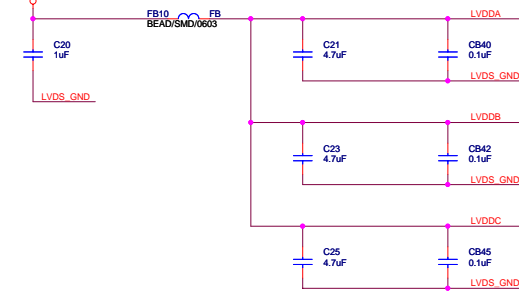
NORMAL VIDEO DAC POWER

DACVDD



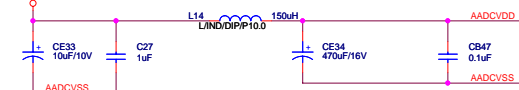
NORMAL VIDEO DAC POWER

AV33A

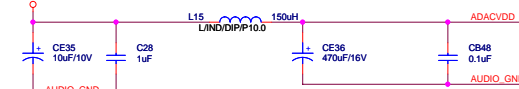


NORMAL AUDIO ADC / DAC POWER

ADC33A

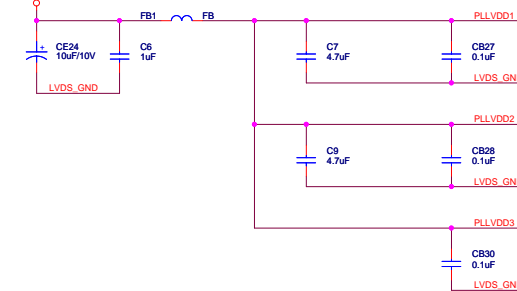


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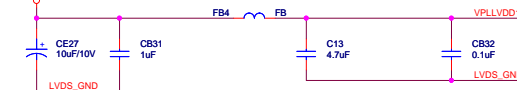


NORMAL ANALOG POWER

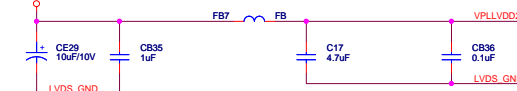
ASB18A



AV18A

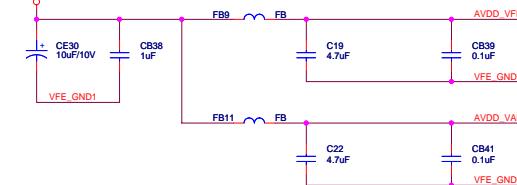


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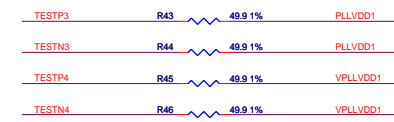
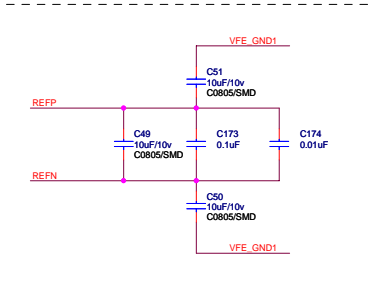
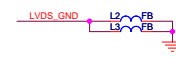
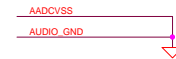
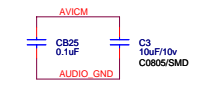
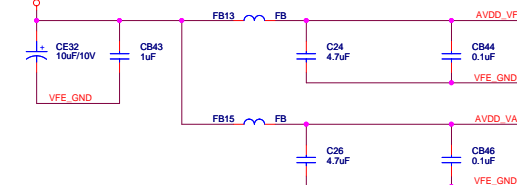


NORMAL VIDEO ADC POWER

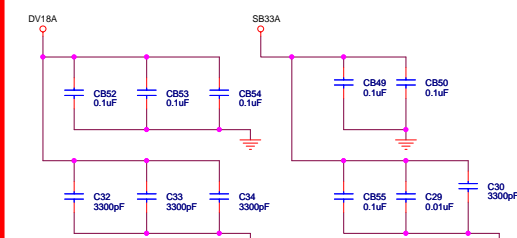
ADC33A



ADC18A

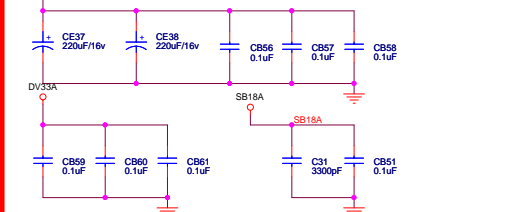


MT8202 DIGITAL POWER & DECOUPLING



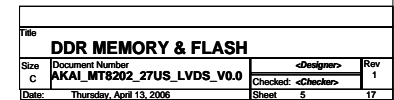
5VSB

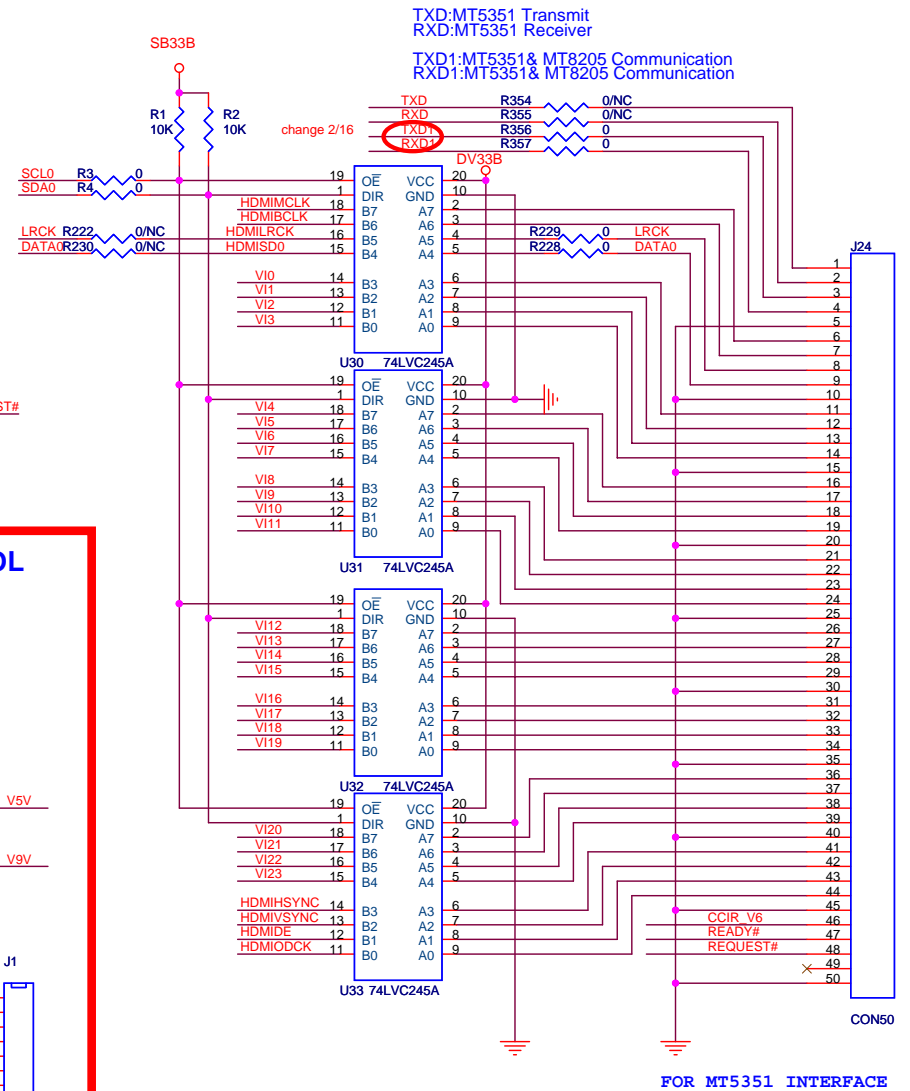
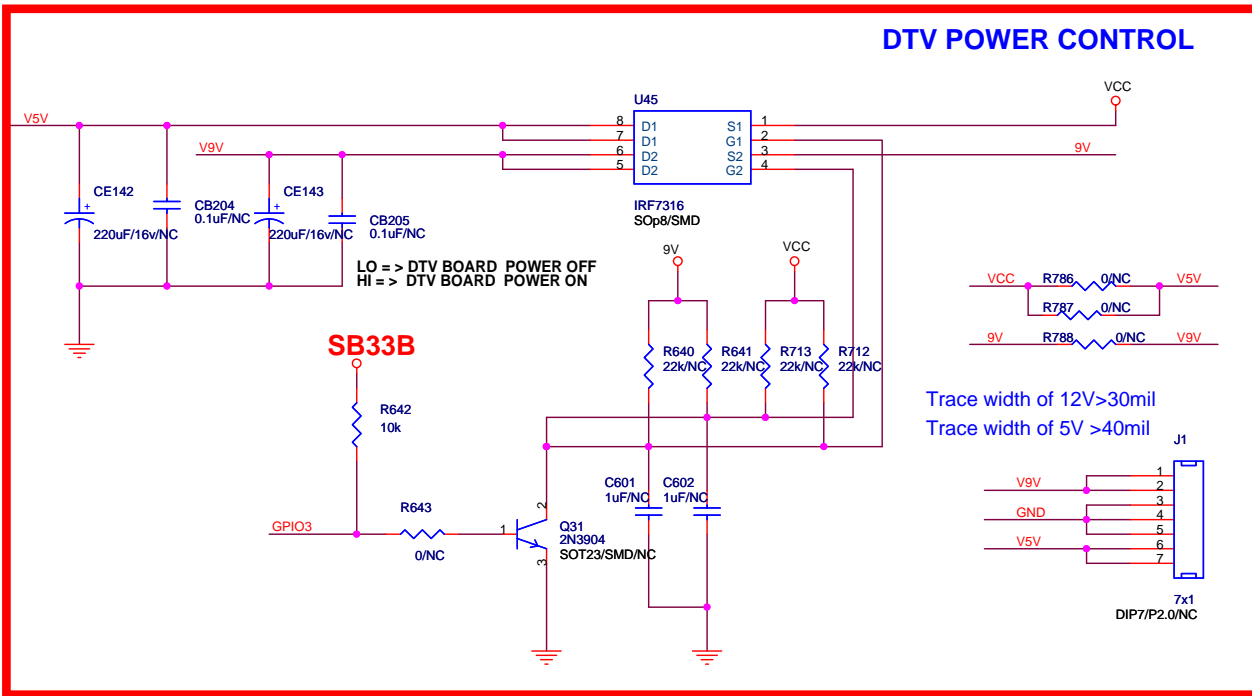
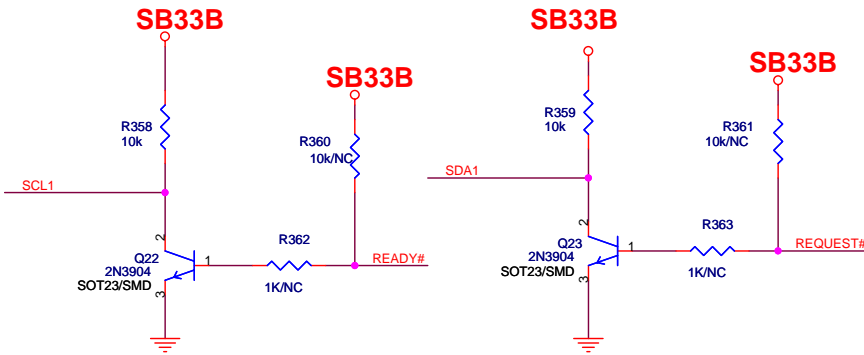
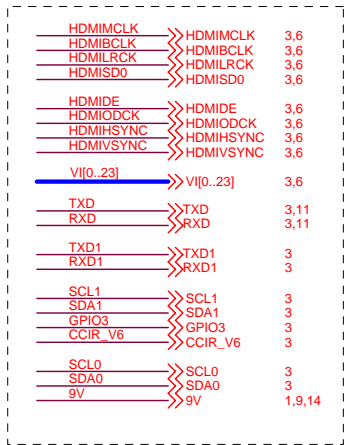
PUT ON NEARLY BGA



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File	MT8202 DECOUPLING	Designer	Rev
Size	Document Number	Checked	1
C	AKAI_MT8202_27US_LVDS_V0.0	Sheet	4
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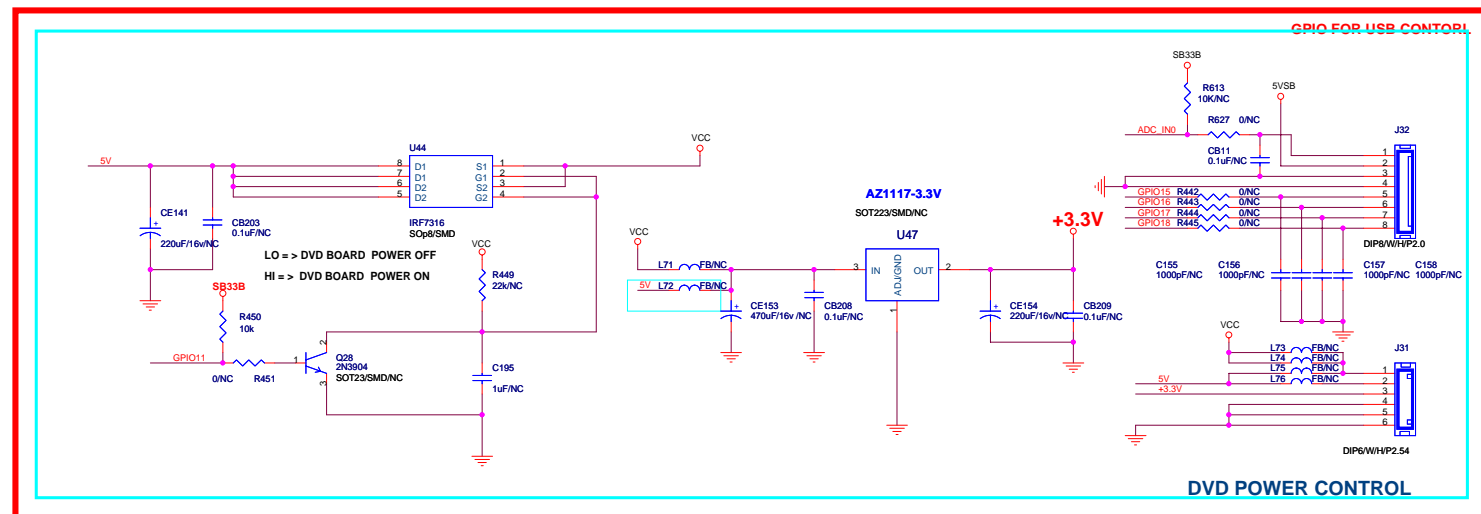
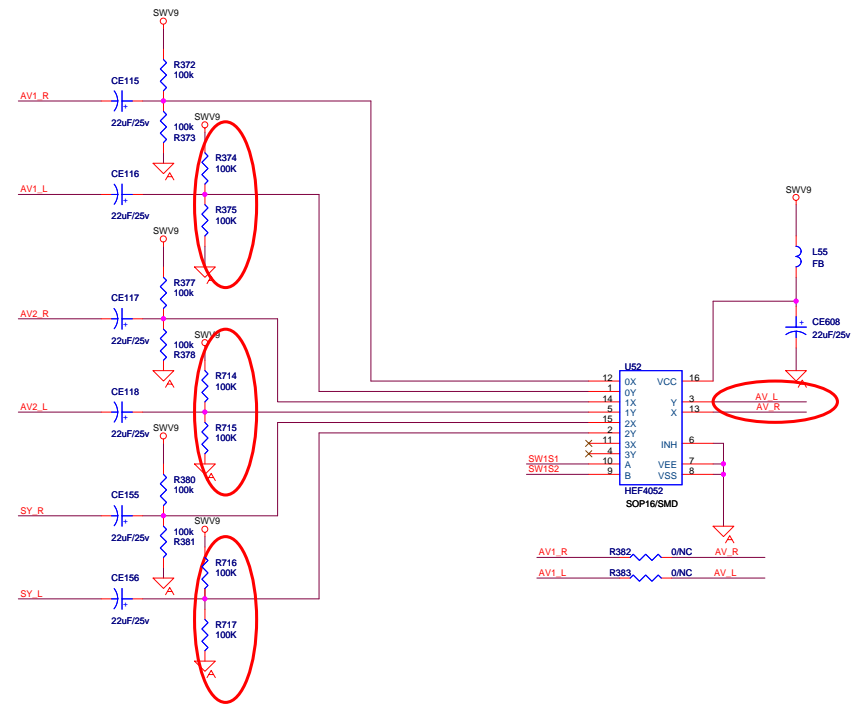
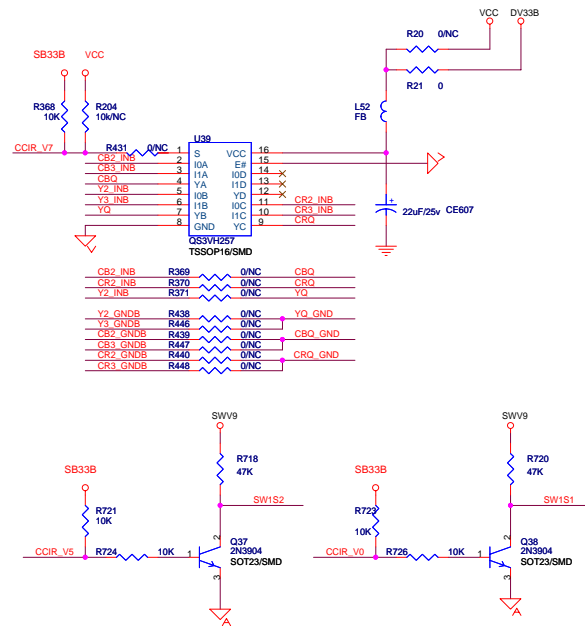


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MT5351 INTERFACE			
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Date:	Thursday, April 13, 2006	Sheet	7

ADC_IN0	ADC_IN0	
CCR0_V0	CCR0_V0	3
CCR_V7	CCR_V5	3
GPIO11	CCR_V7	3
GPIO11	GPIO11	3
GPIO16	GPIO15	3
GPIO17	GPIO17	3
GPIO18	GPIO18	3
VFE_GND	VFE_GND	2,3,4,11
AADC_VSS	AADC_VSS	3,4,10
AV1_L	AV1_L	15
AV2_L	AV2_L	15
SV_R	SV_R	15
Y2_INB	Y2_INB	15
Y2_GND	Y2_GND	15
CB2_INB	CB2_INB	15
CB2_GND	CB2_INB	15
CR2_INB	CR2_INB	15
Y3_INB	Y3_INB	15
CB3_INB	Y3_GND	15
CB3_GND	CB3_GND	15
CR3_GND	CR3_INB	15
CR3_GND	CR3_GND	15
9V	9V	1,7,3,14

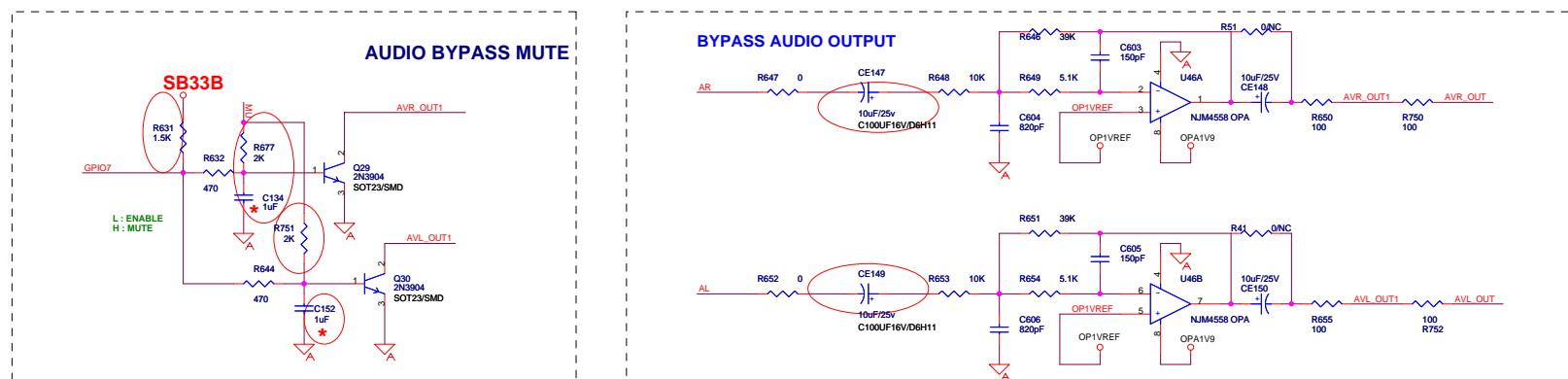
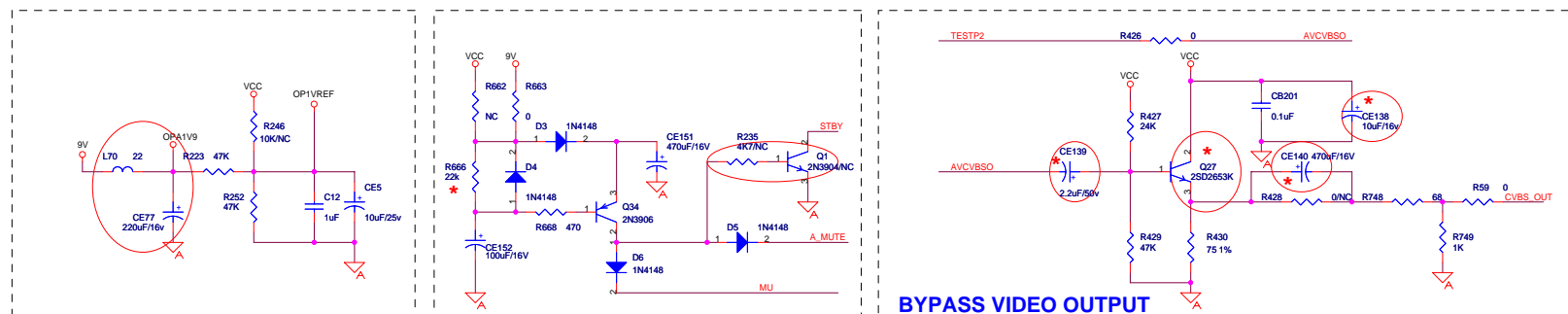
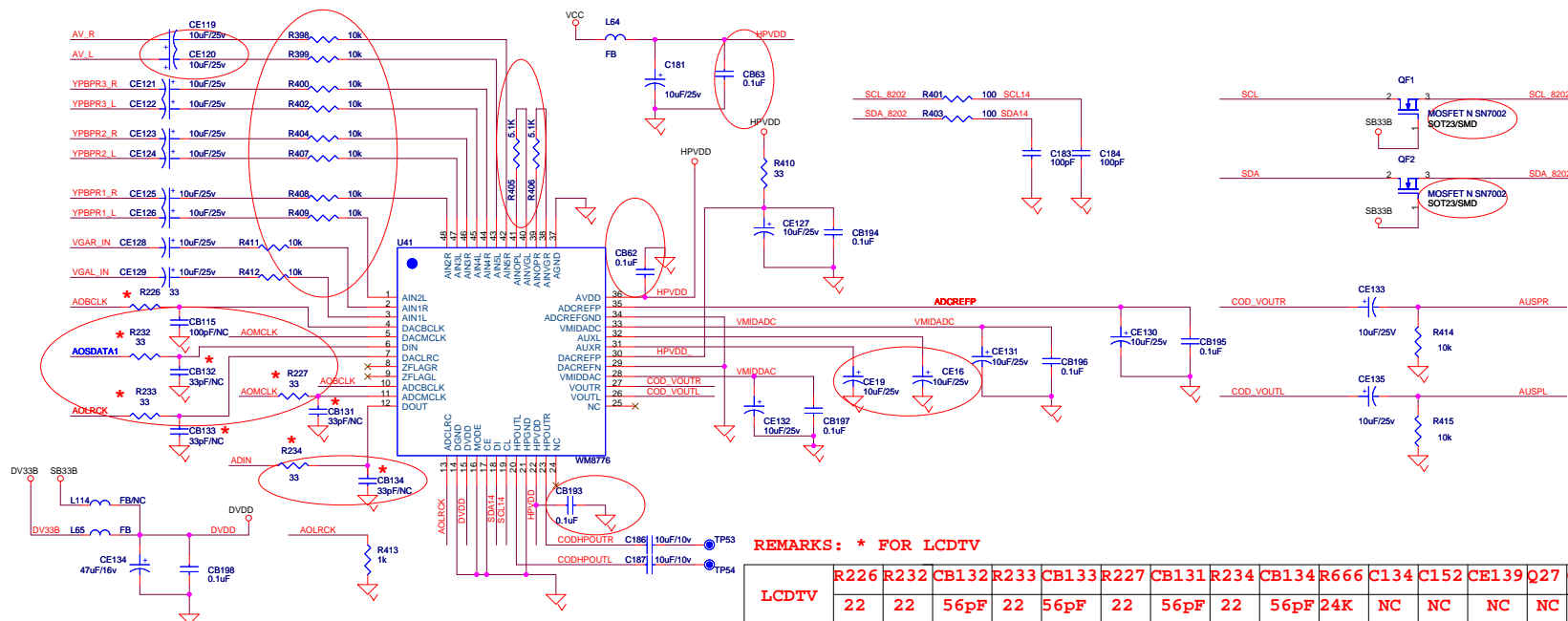
AV_R	AV_R	9
AV_L	AV_L	9
YQ	YQ	10
CBQ	CBQ	10
CRQ	CRQ	10
YQ_GND	YQ_GND	10
CBQ_GND	CBQ_GND	10
CRQ_GND	CRQ_GND	10

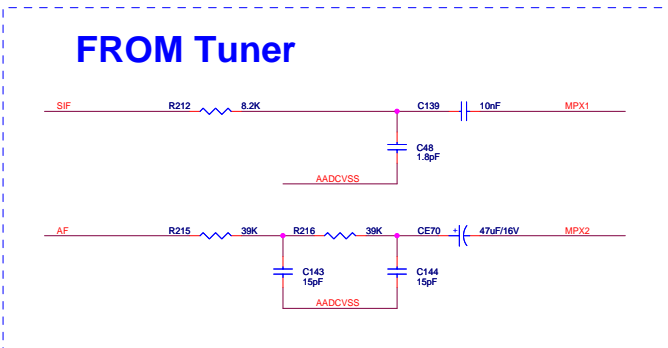
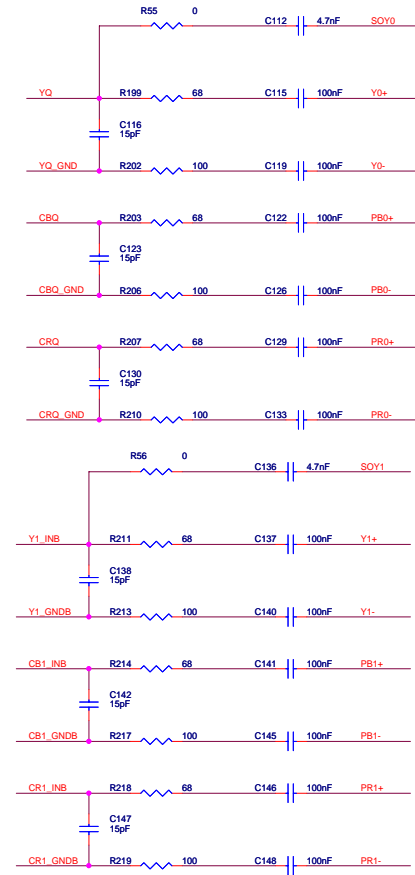
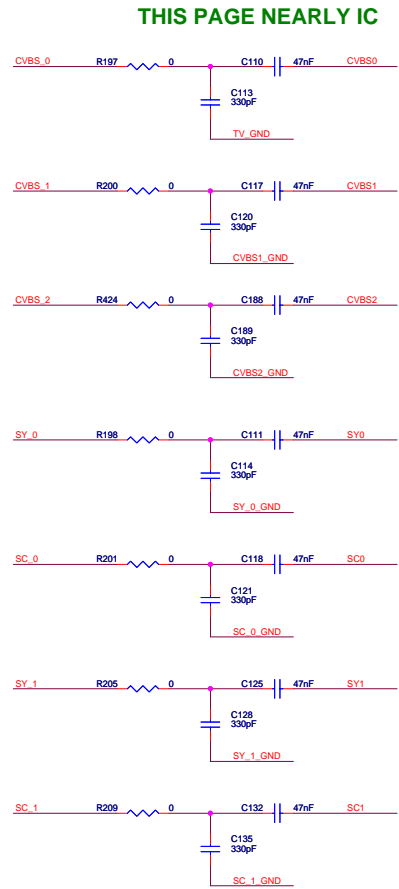
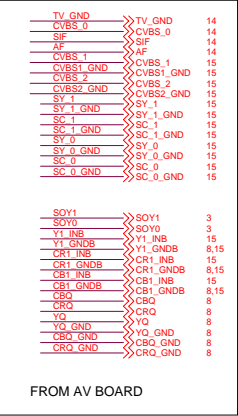
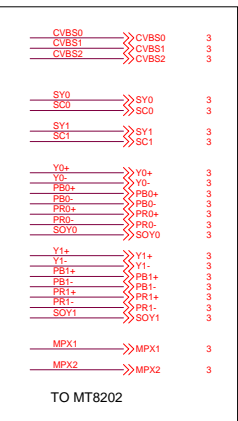


Title			
DAUGHTER BOARD IN			
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Date:	Thursday, April 13, 2006	Sheet	17
		8	

GPIO7	X	GPIO7	3
SCL	X	SCL	1.14
SDA	X	SDA	1.14
SCL_R202	X	SDA_R202	3.6,12
SCL_R202	X	SCL_R202	3.6,12
A0SDATA1	X	A0SDATA1	3
A0CLK	X	A0CLK	3.16
A0BCLK	X	A0BCLK	3.16
A0RLCK	X	A0RLCK	3.16
AVR	X	ADIN	3
AVR	X	ADOUT	3
YBPBPR1_L	X	AV_L	8
YBPBPR1_R	X	YBPBPR1_L	15
YBPBPR2_L	X	YBPBPR2_R	15
YBPBPR3_L	X	YBPBPR2_L	15
YBPBPR3_R	X	YBPBPR3_R	15
YGAL_IN	X	YGAL_IN	11
YGAL_IN	X	YGAL_IN	11
TESTP2	X	TESTP2	3
AI	X	AI	3
AI	X	AI	3
MU	X	MU	16
A_MUTE	X	A_MUTE	17
9V	X	9V	1.14,14

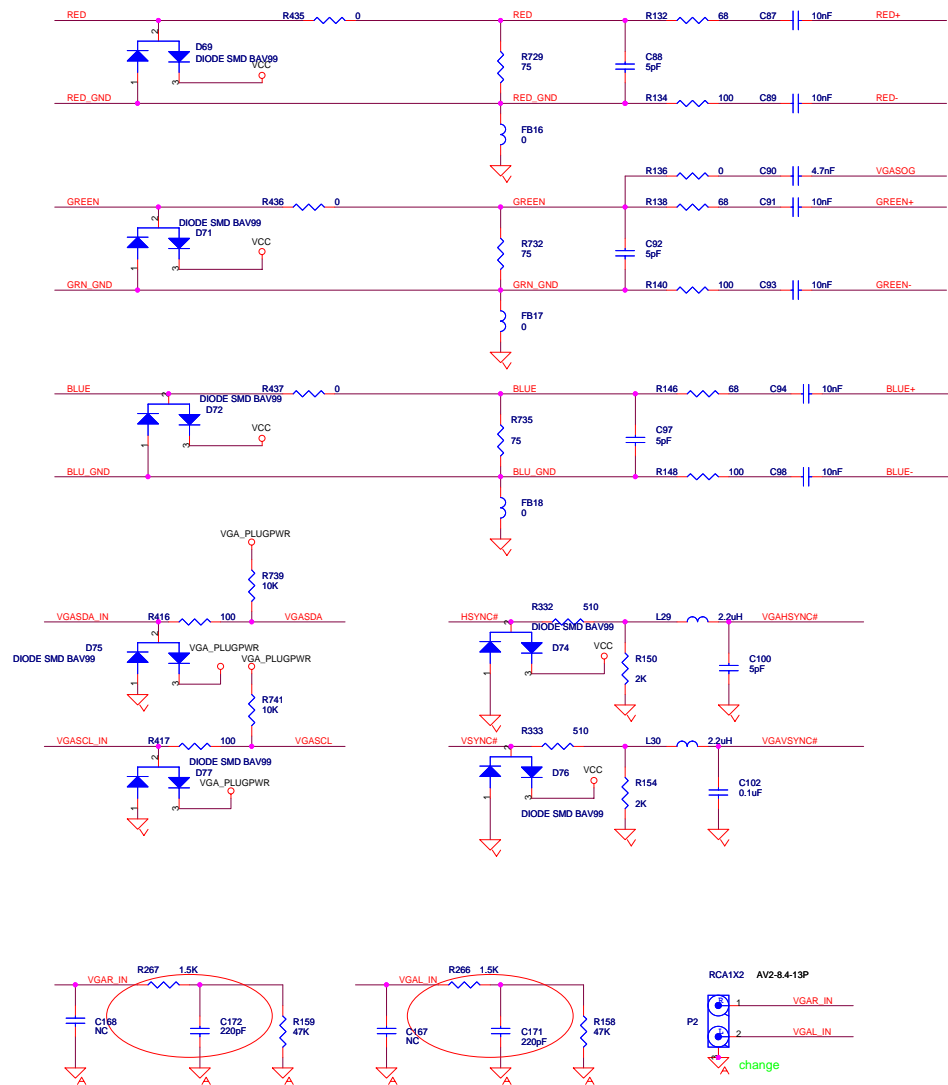
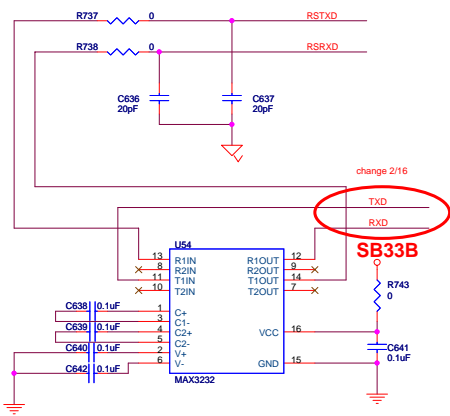
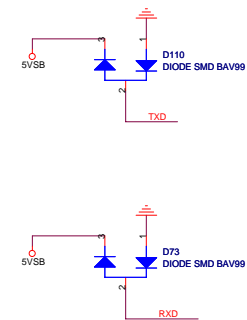
AUSPR	» AUSPR	16
AUSPL	» AUSPL	16
AVR_OUT	» AVR_OUT	15
AVL_OUT	» AVL_OUT	15
CVBS_OUT	» CVBS_OUT	6.15



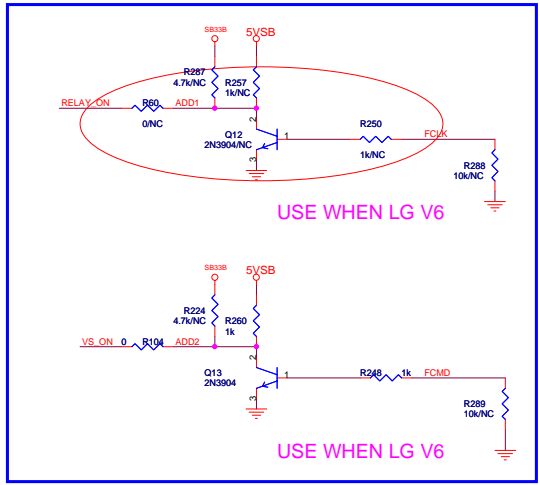
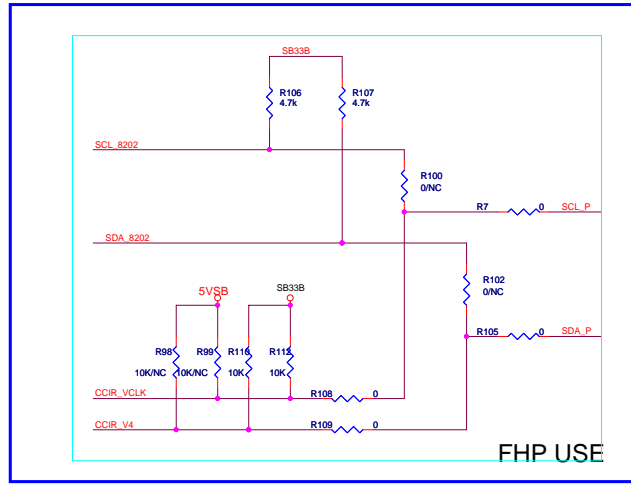
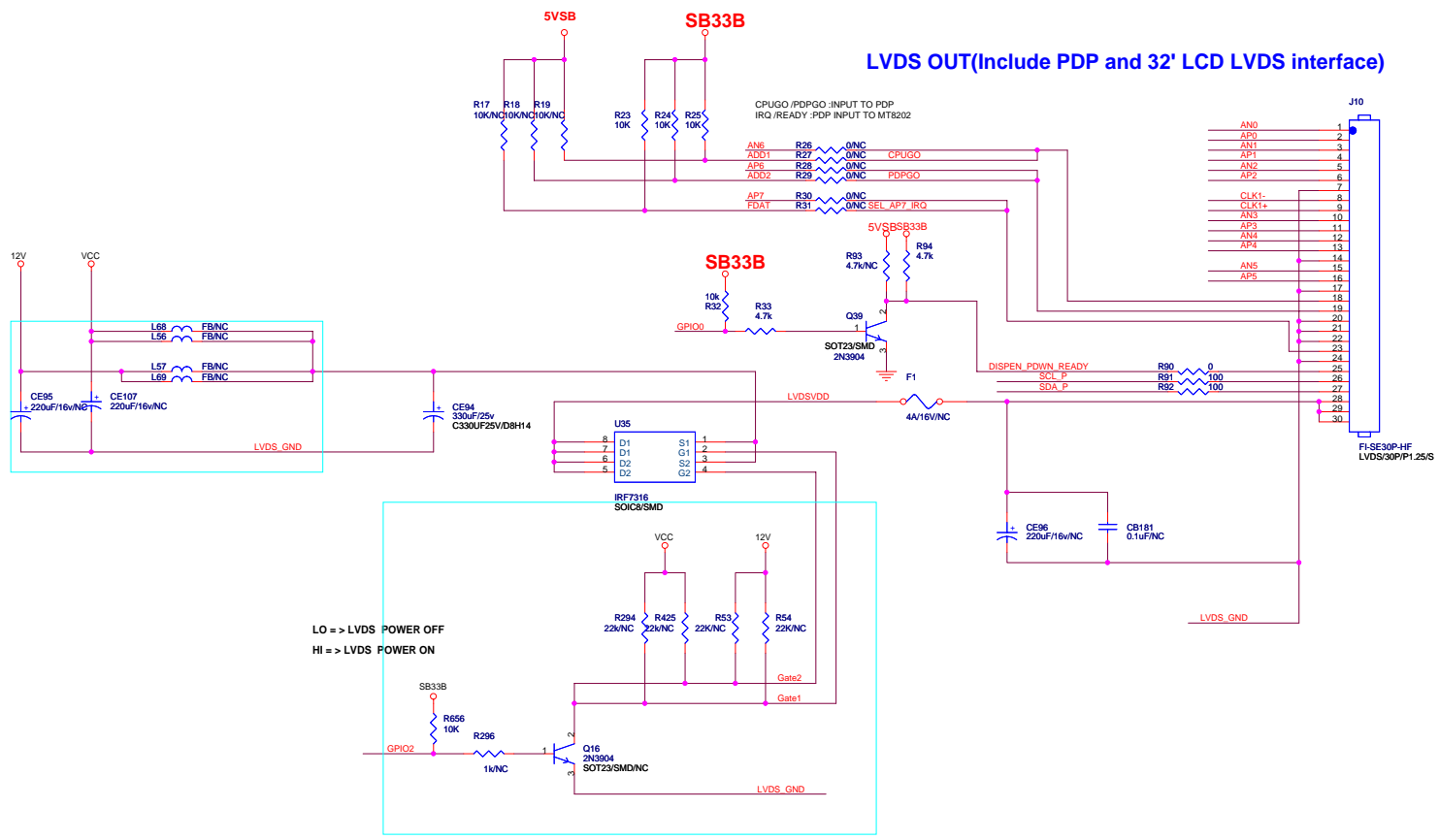


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AUDIO / VIDEO IN CIRCUIT			
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Date:	Thursday, April 13, 2006	Sheet	17



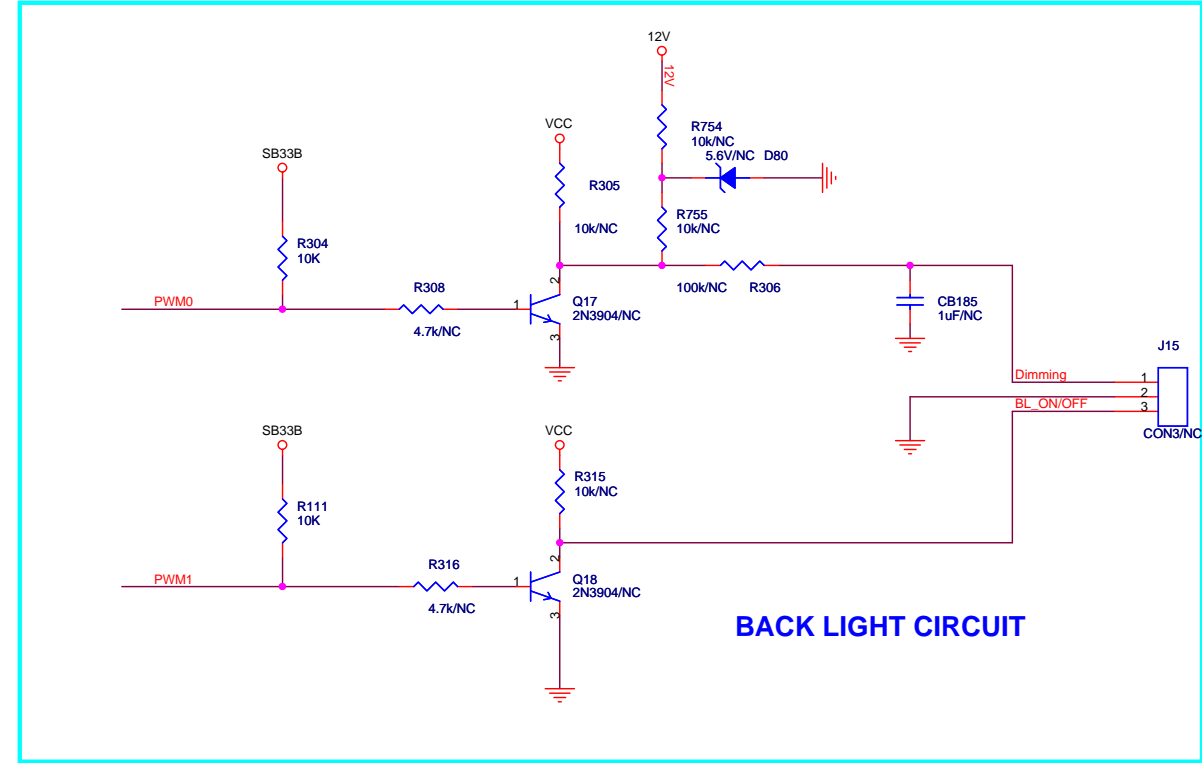
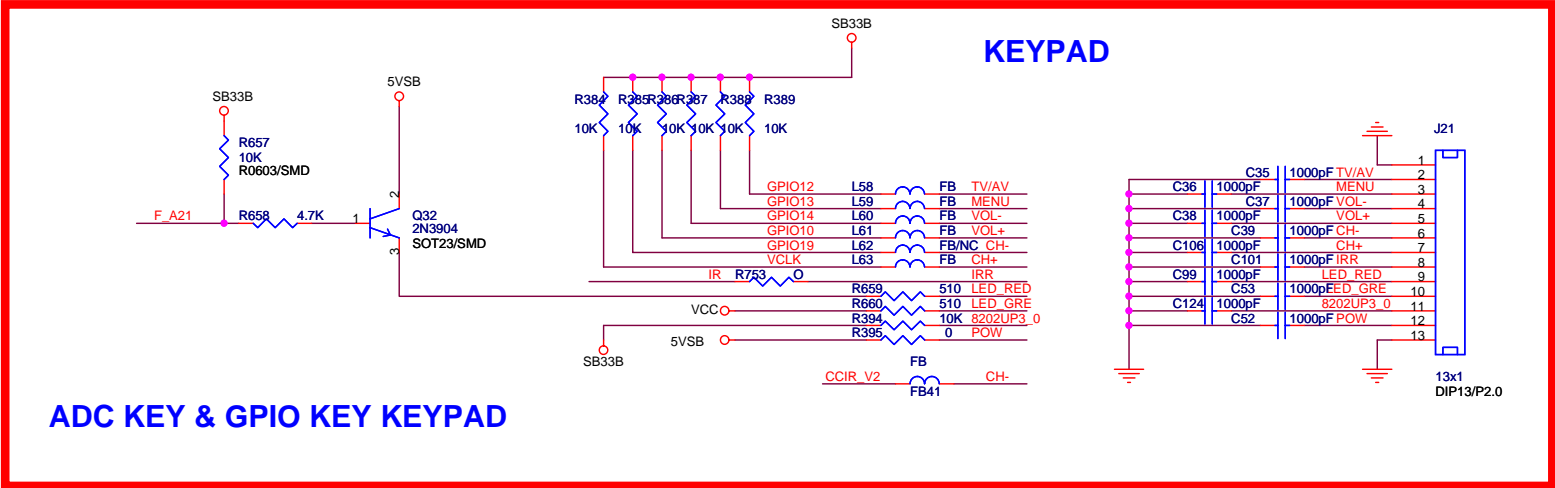
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GPI02	>>>	GPI02	1,3
CLK1+	>>>	CLK1+	3
CLK1-	>>>	CLK1-	3
AP0_7	>>>	AP0_7	3
AP0_6	>>>	AP0_6	3
LVDS_GND	>>>	LVDS_GND	2,3,4
LVDS100	>>>	LVDS100	2,3,4
CCIR_VCLK	>>>	CCIR_VCLK	3
CCIR_V4	>>>	CCIR_V4	3
FCLK	>>>	FCLK	3
FCMD	>>>	FCMD	3
FDAT	>>>	FDAT	3
SCL_8202	>>>	SCL_8202	3,6,9
SDA_8202	>>>	SDA_8202	3,6,9
RELAY_ON	>>>	RELAY_ON	1
VS_ON	>>>	VS_ON	1
12V	>>>	12V	1,13



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Title			
LVDS OUT			
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Date:	Thursday, April 13, 2006	Checked: <Checker>	Sheet 12 17

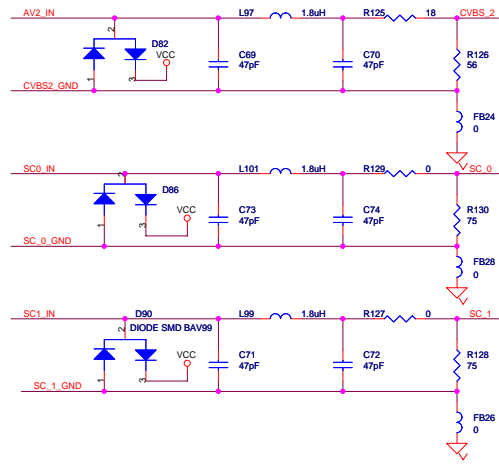
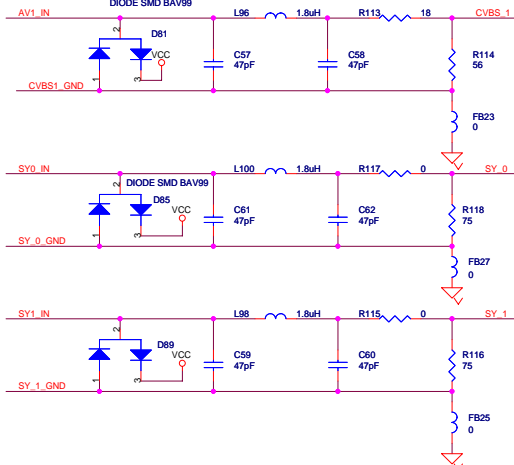
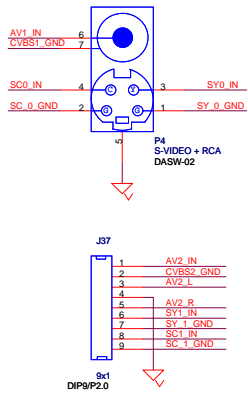
IR	>>>IR	3,15
GPIO10	>>>GPIO10	3
GPIO12	>>>GPIO12	3
GPIO13	>>>GPIO13	3
GPIO14	>>>GPIO14	1,3
PWM0	>>>PWM0	3
PWM1	>>>PWM1	3
8202UP3_0	>>>8202UP3_0	3
GPIO14	>>>GPIO14	1,3
GPIO19	>>>GPIO19	1,3
VCLK	>>>VCLK	3
F_A21	>>>F_A21	3
CCIR_V2	>>>CCIR_V2	3
12V	>>>12V	1,12



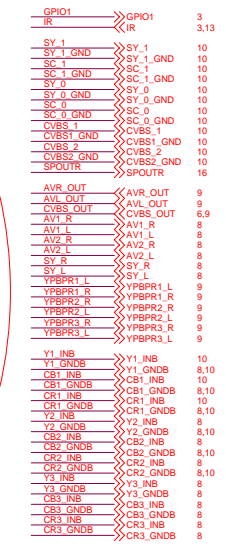
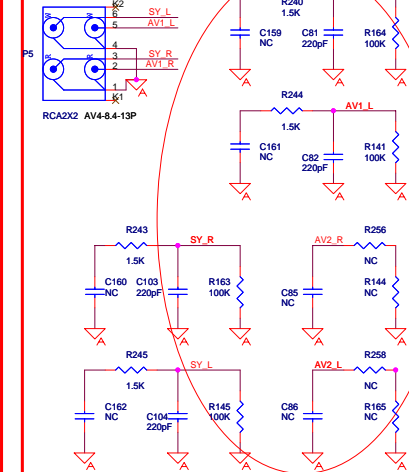
KAWA Confidential

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BACK LIGHT / KEYPAD			
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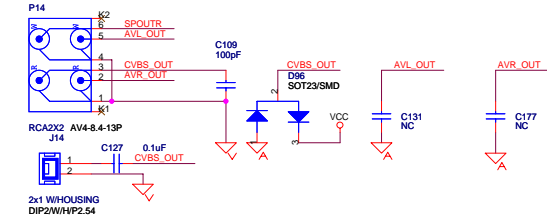
AV /YC VIDEO IN



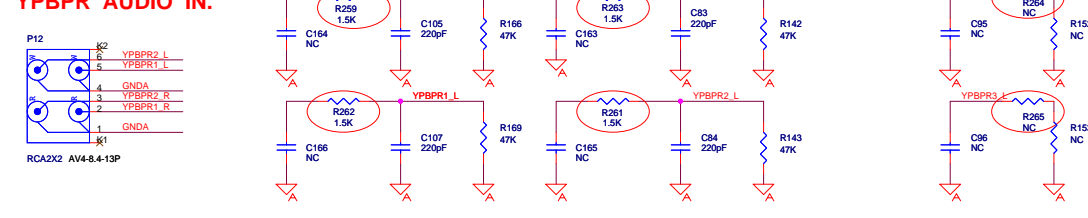
AV /YC AUDIO IN



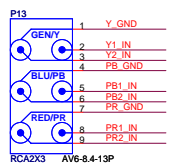
AV VIDEO/AUDIO OUT.



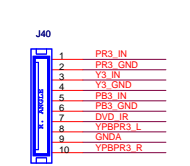
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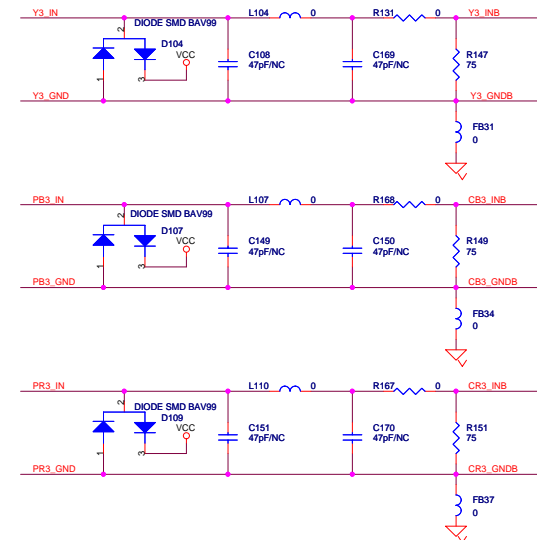
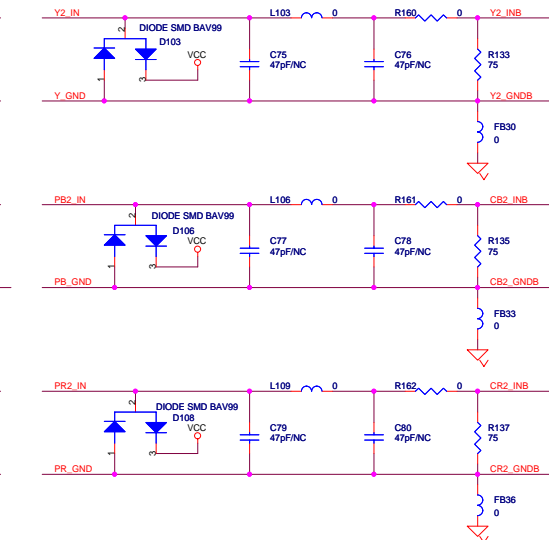
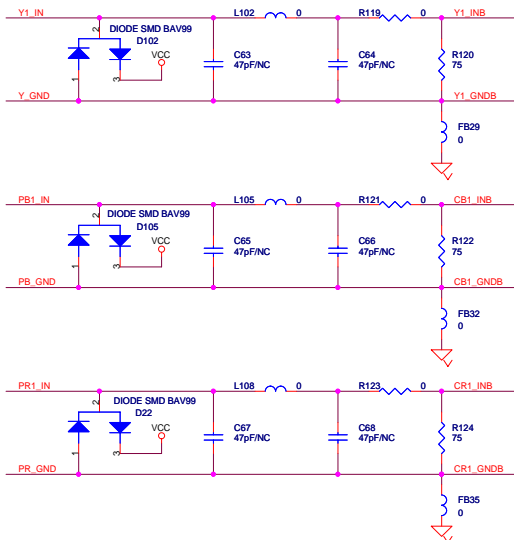
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YPBPR1 / 2 INPUT.

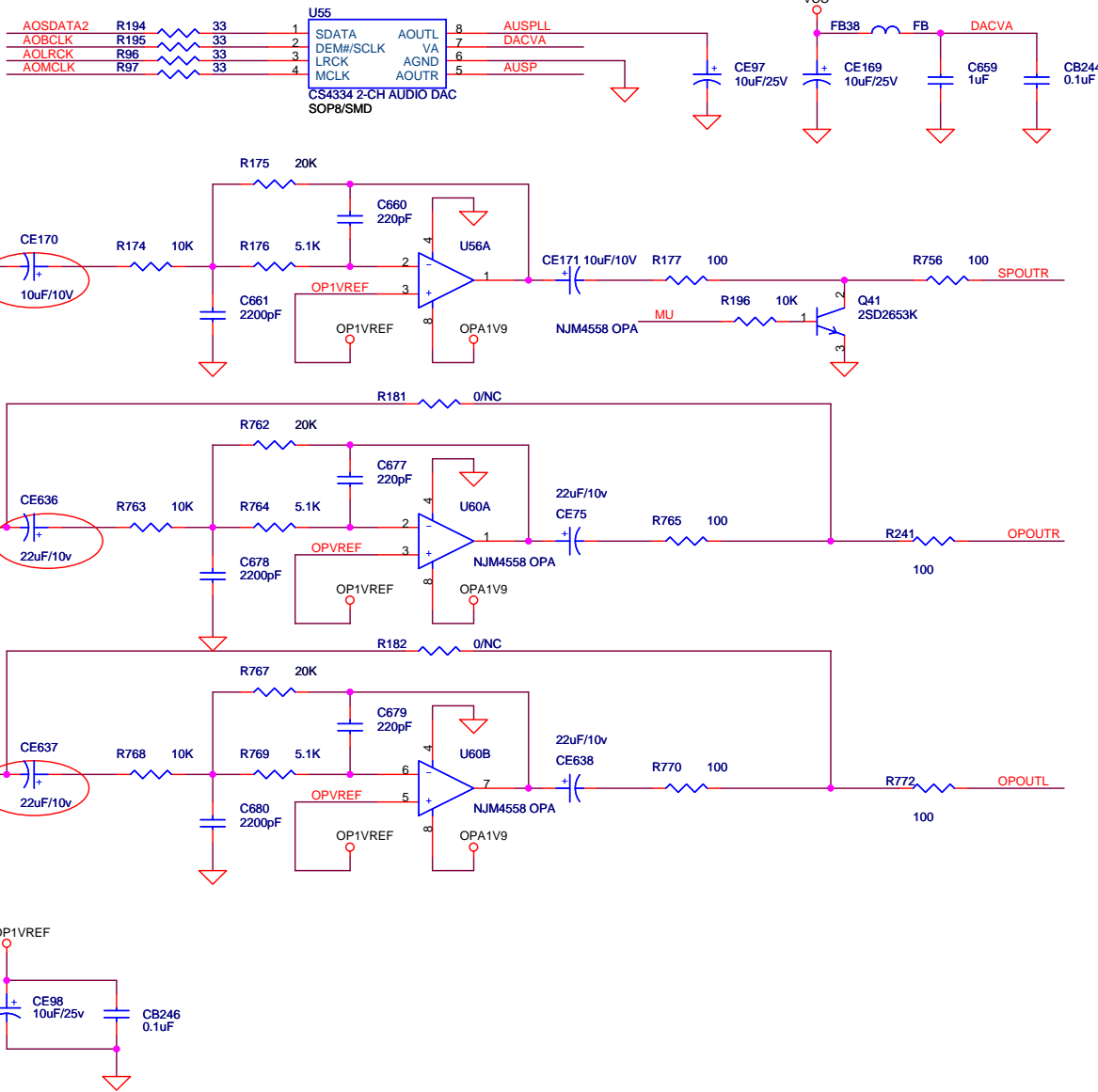


YPBPR 3 INPUT.



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AOSDATA2 >> AOSDATA2 3
 AOMCLK >> AOMCLK 3,9
 AOBCLK >> AOBCLK 3,9
 AOLRCK >> AOLRCK 3,9
 MU >> MU 9
 SPOUTR >> SPOUTR 15
 AUSPR >> AUSPR 9
 AUSPL >> AUSPL 9
 OPOUTR >> OPOUTR 17
 A MUTE >> A_MUTE 9,17



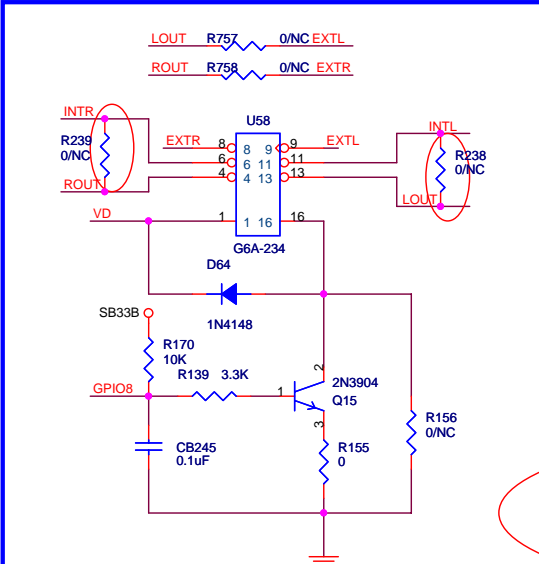
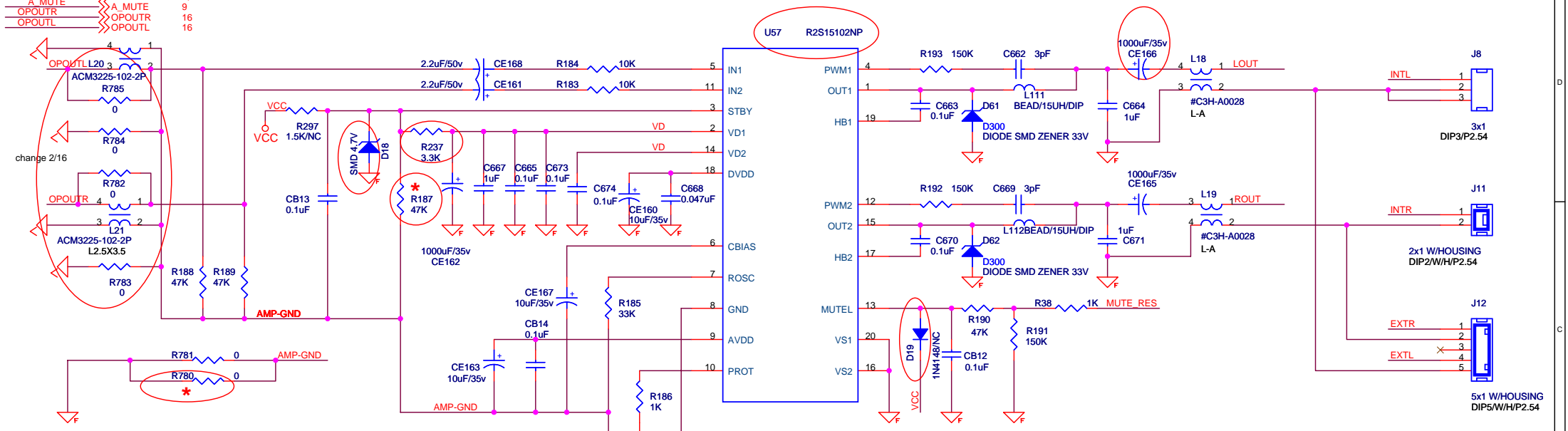
GPIO DECIPTION

UP3_4 : SW SCL
 UP3_5 : SW SDA
 ERO0/UP3_0 :KEYPAD POWER
 ERO1/UP3_1 : MAIN POWER SWITCH
 VCLK : KEPAD CH+
 GPIO19 : KEPAD CH-
 DE/GPIO : DVD IR
 CCIR_CLK : PDP USE
 CCIR_V4 : PDP USE
 GPIO0 : PDP USE
 GPIO1 : NO USE
 GPIO2 : LVDS POWER SW
 GPIO3 : DTV POWER CONTROL
 GPIO4 : EEPROM WRITE PROTECT
 GPIO5/TXD : 2nd UART FOR MT5351
 GPIO6/RXD : 2nd UART FOR MT5351
 GPIO7 : AUDIO BYPASS MUTE CONTROL
 GPIO8 : SPEAKER SWITCH
 GPIO9 : AUDIO MUTE
 GPIO10 : Indicates active video at HDMI port
 GPIO11 : DVD POWER CONTROL
 GPIO12 : AV SWITCH
 GPIO13 : HDMI Hot Plug Detect
GPIO14 : NO USE
 GPIO[15..18] : FOR DVD CONTROL
 GPIO/PWM0 : DIMMING
 GPIO/PWM1 : BACKLIGHT ON/OFF
 OUT_27Mhz/GPIO : HDMI CRYSTAL
 SDA1 : TO MT5351 I/F REQUEST
 SCL1 : TO MT5351 I/F READY
 F_A21 : KEYPAD(LED RED)
 ADCIN0 : KEYPAD
 ADCIN3:PDP 5VD DETECT
 ADCIN4:FOR TUNER AFC
 CCIR_V[0-3] : KEYPAD
 CCIR_V5 : AUDIO SWITCH
 CCIR_V6 : RESET DTV
 CCIR_V7 : YBPBR VIDEO SWITCH

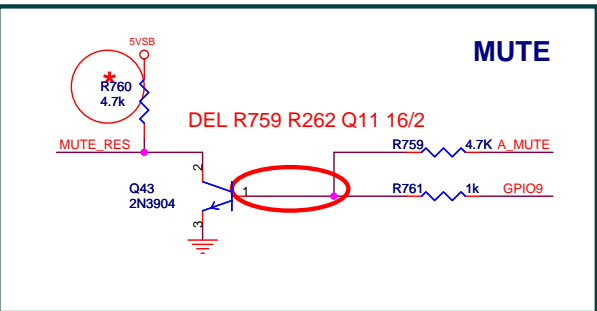
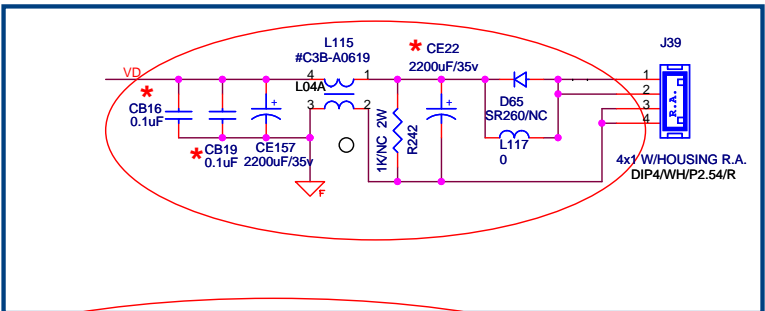
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GPIO8	GPIO8	3
GPIO9	GPIO9	3
AUSPR	AUSPR	9,16
AUSPL	AUSPL	9,16
A_MUTE	A_MUTE	9
OPOUTR	OPOUTR	16
OPOUTL	OPOUTL	16



GPIO8: SPEAKER SWITCH(INTERNAL OR EXTERNAL)



REMARKS: * FOR LCDTV

LCDTV	R780	R187	R760	CB16	CB19	CE22
	NC	51K	2.2K	NC	NC	NC

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Title			
AUDIO Amplifier			
Size	Document Number	<Designer>	Rev
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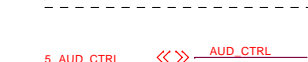
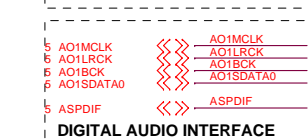
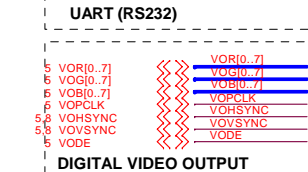
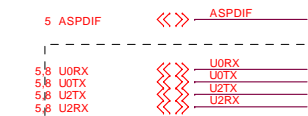
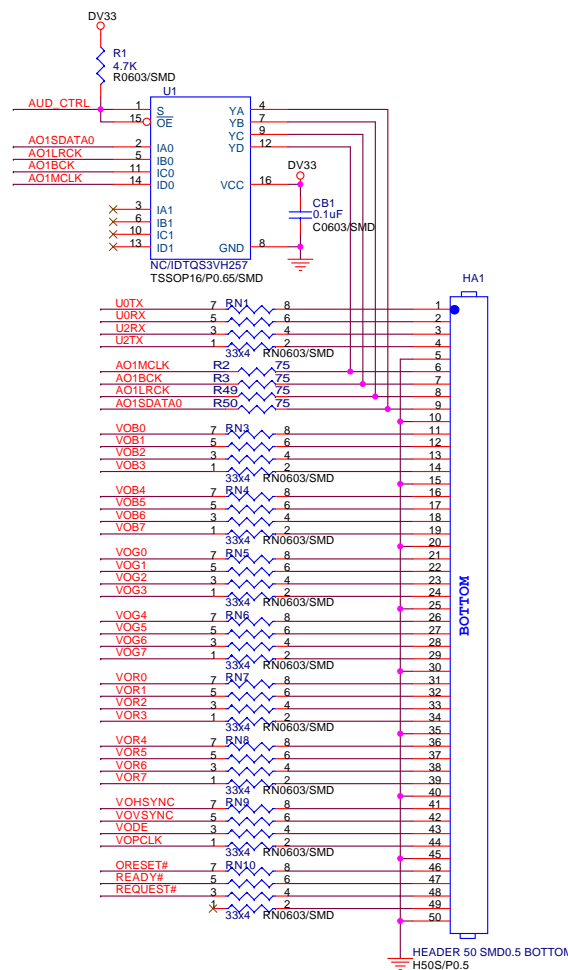
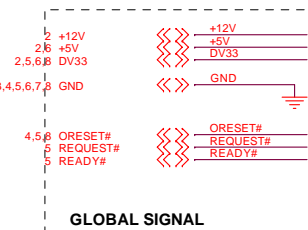
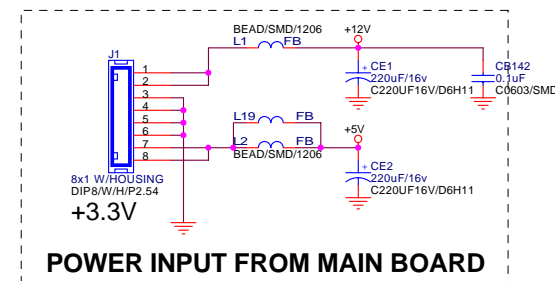
MT5111 / MT5351 REFERENCE DESIGN - 4 LAYERS

Rev	History	P#	DATE
RA-V1	INITIAL VERSION		2005/06/15
RA-V2	ADDED AUDIO SWITCH / REFINE POWER CIRCUIT		2005/07/14

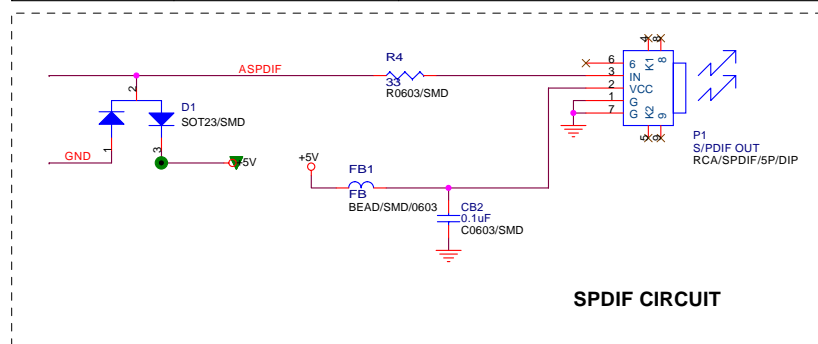
01. INDEX AND INTERFACE
02. POWER
03. TUNER
04. MT5111 ASIC
05. MT5351 ASIC
06. MT5351 PERIPHERAL
07. DDR MEMORY
08. NOR FLASH / JTAG / UART

NS : NON-STUFF

NAME	TYPE	DEVICE
+12V +5V	POWER +12V POWER +5V	POWER SUPPLY POWER SUPPLY
+5V_tuner DV33_DM DV18 DV33 AV33 DV25 DV12	POWER +5V POWER +3V3 POWER +1V8 POWER +3V3 POWER +3V3 POWER +2V5 POWER +1V2	TUNER POWER MT5111 POWER MT5111 POWER MT5351 POWER MT5351 ANALOG POWER MT5351 DDR POWER MT5351 POWER
GND	GROUND	GROUND



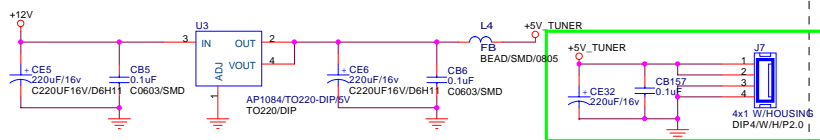
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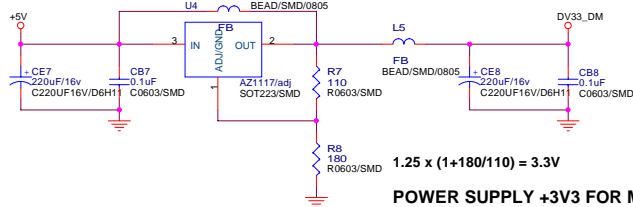
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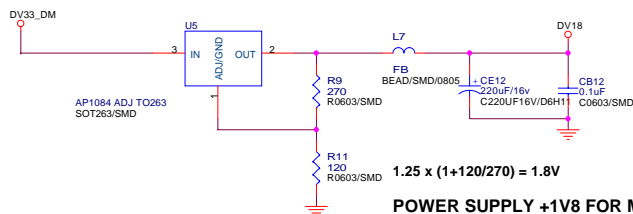
9V



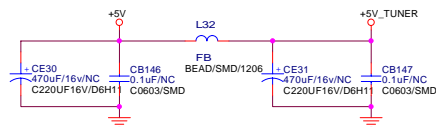
POWER SUPPLY +5V FOR TUNER



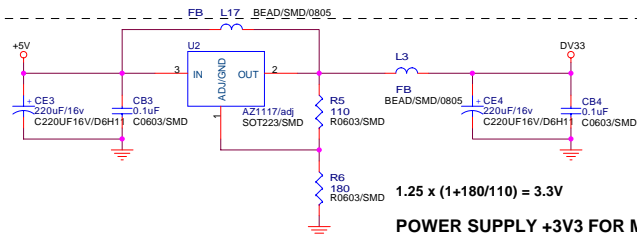
POWER SUPPLY +3V3 FOR MT5111



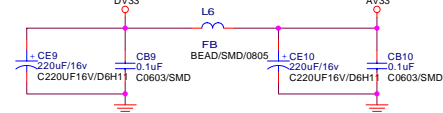
POWER SUPPLY +1V8 FOR MT5111



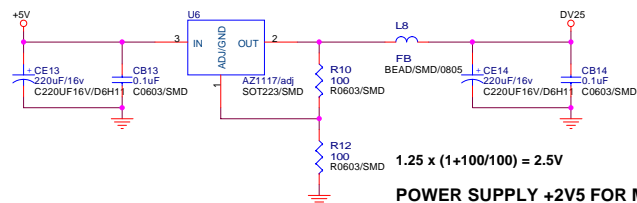
Compatible With U6



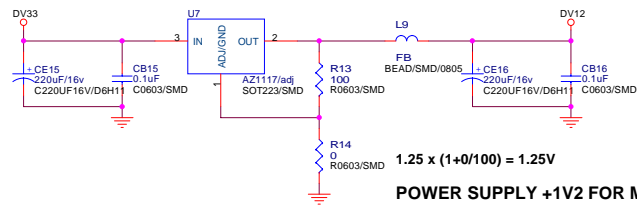
POWER SUPPLY +3V3 FOR MT5351



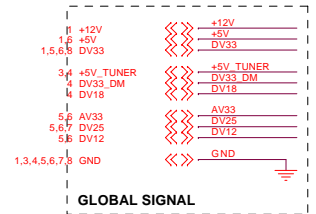
POWER SUPPLY +3V3 FOR MT5351 (ANALOG)



POWER SUPPLY +2V5 FOR MT5351 AND DDR



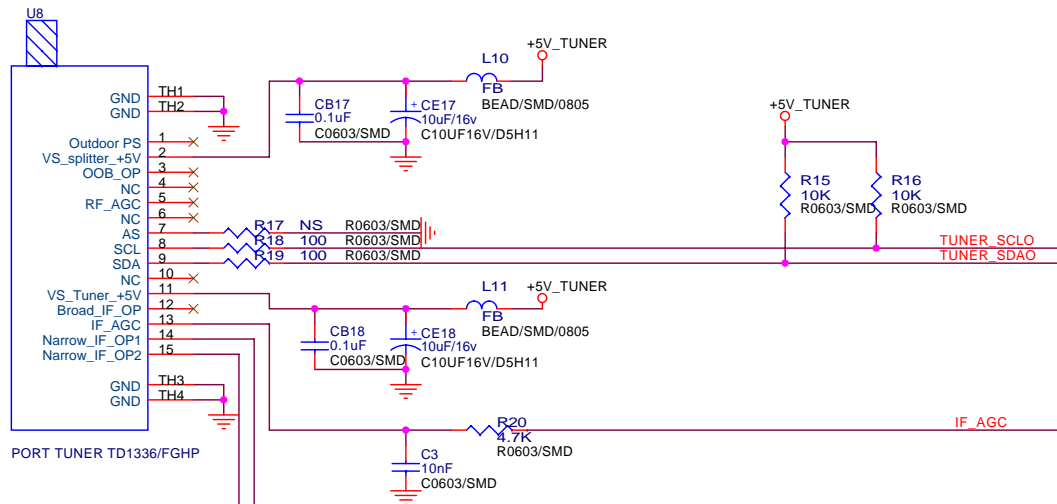
POWER SUPPLY +1V2 FOR MT5351



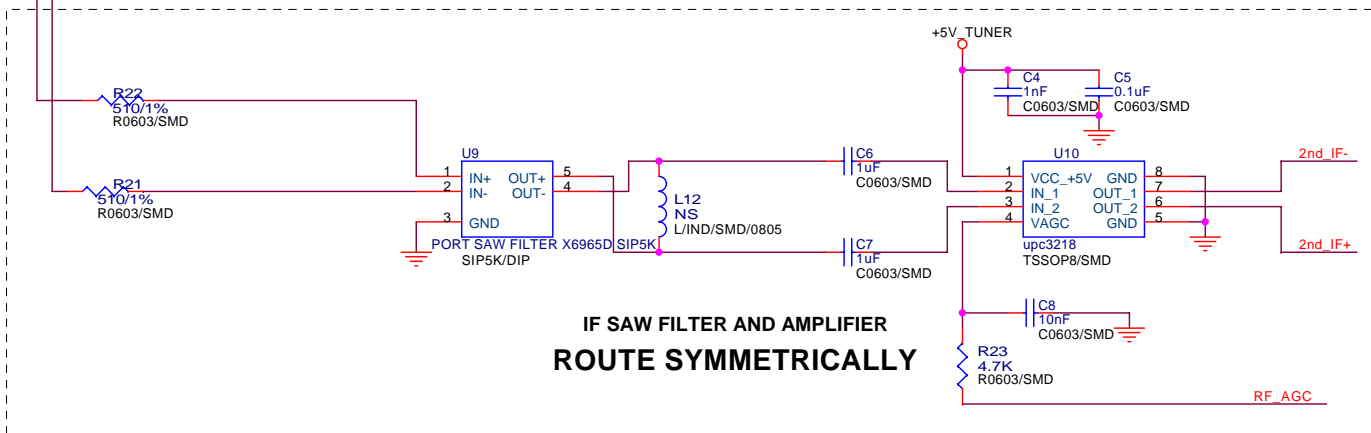
GLOBAL SIGNAL

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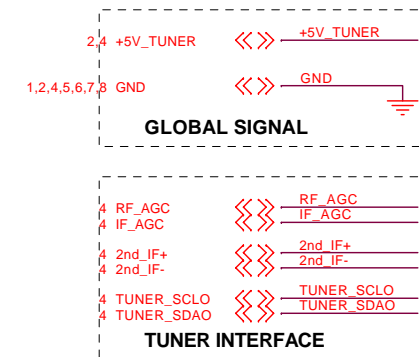
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PORT TUNER TD1336/FGHP



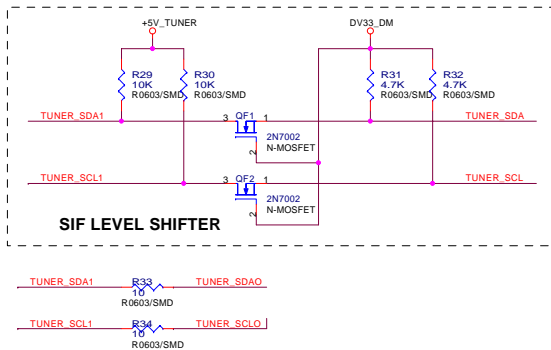
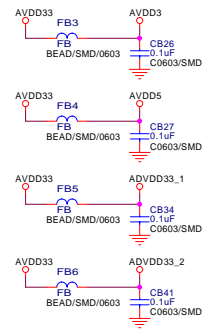
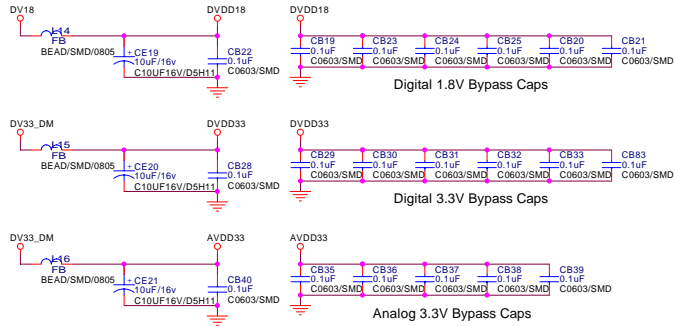
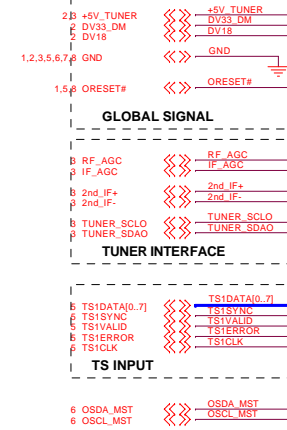
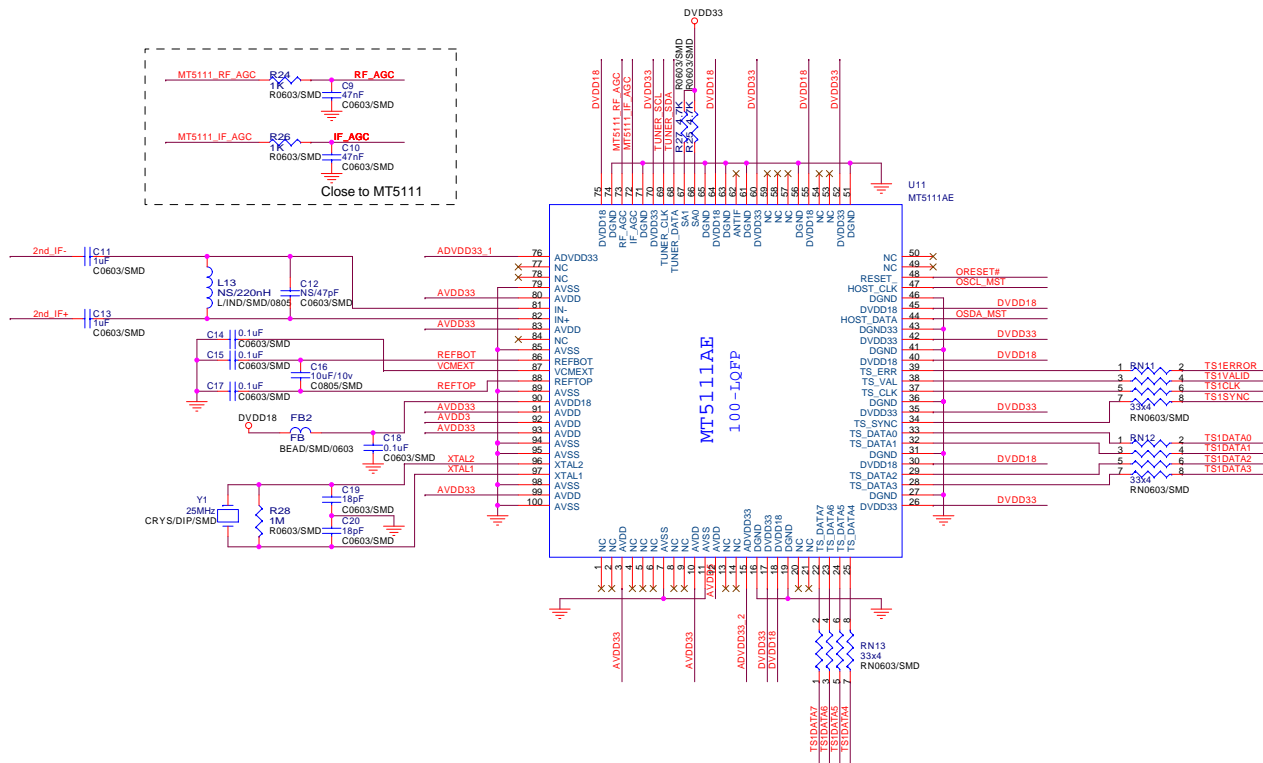
IF SAW FILTER AND AMPLIFIER
ROUTE SYMMETRICALLY



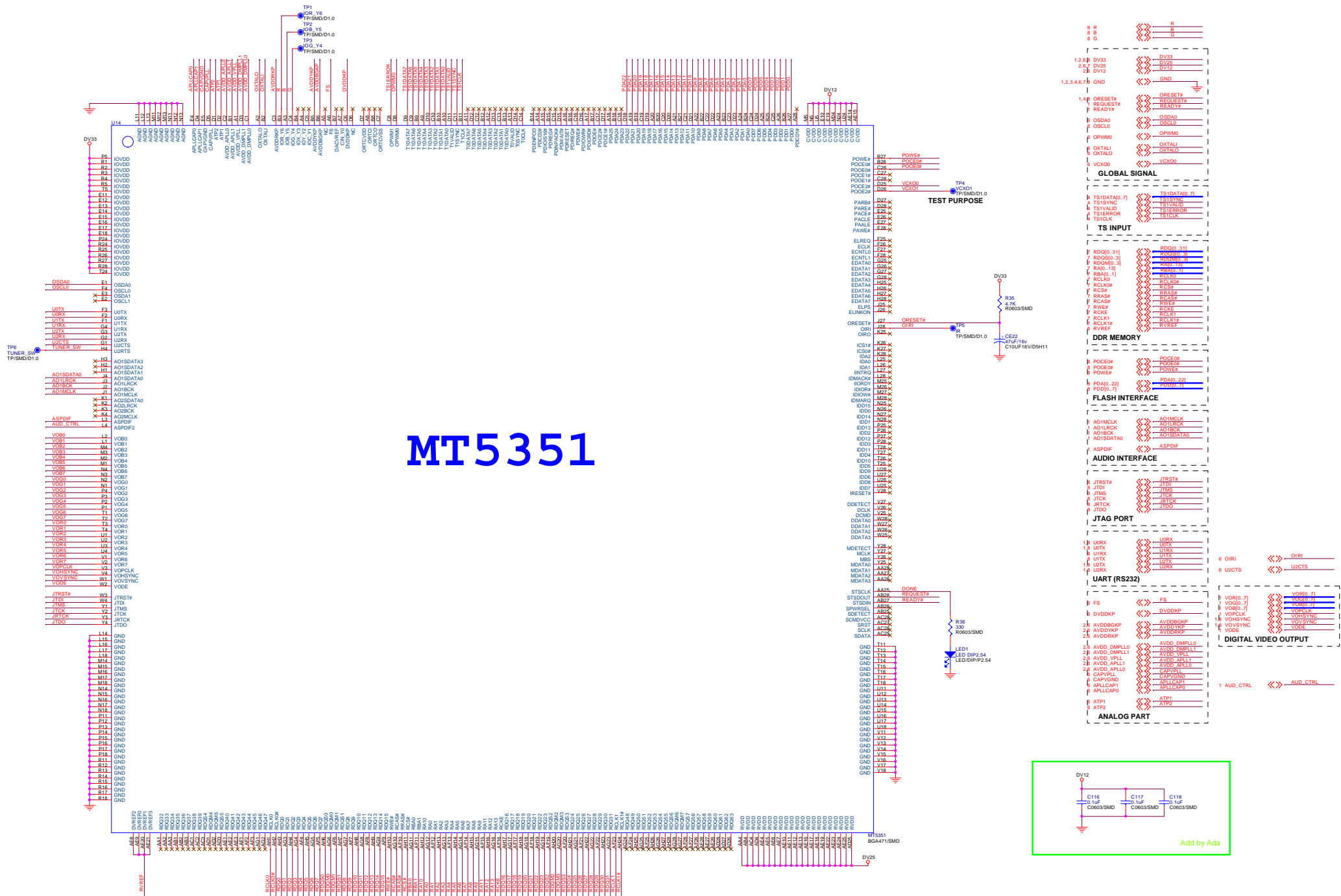
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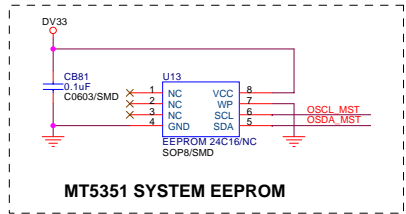
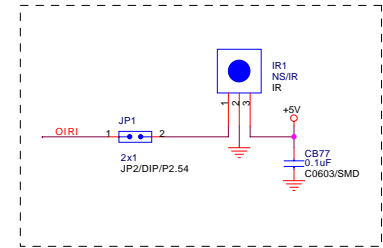
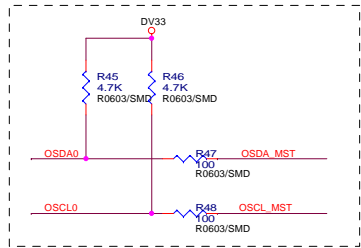
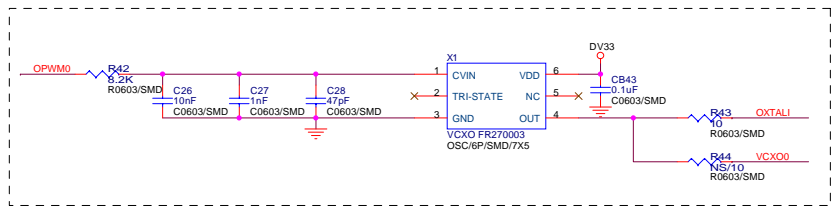
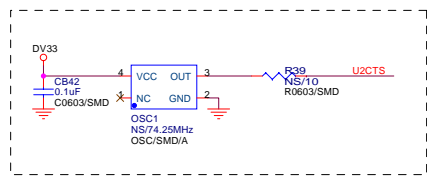
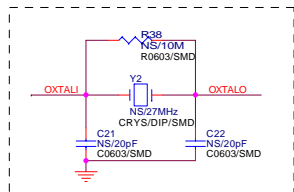
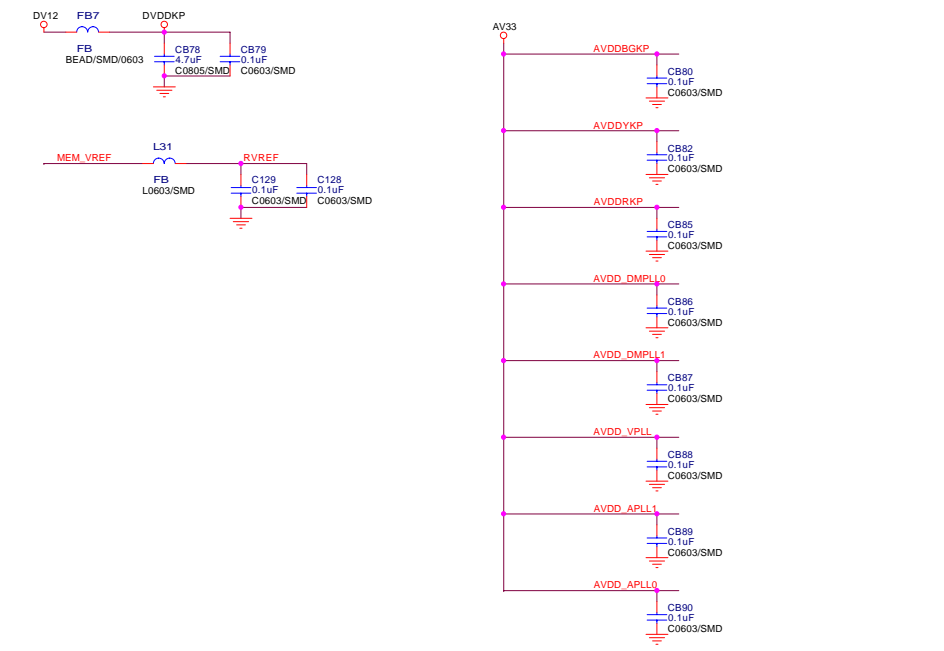
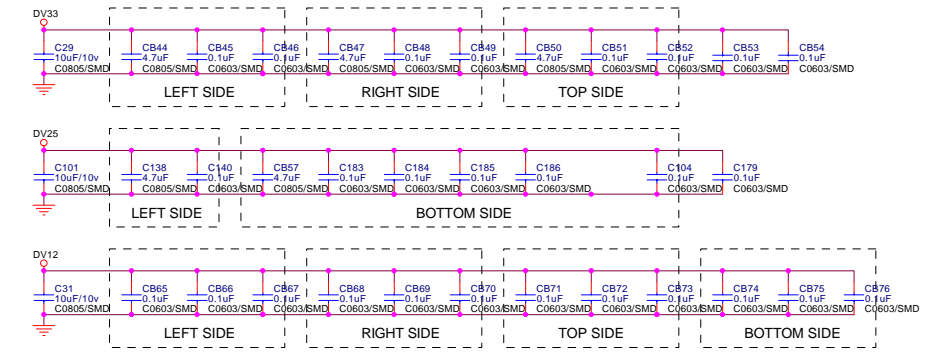
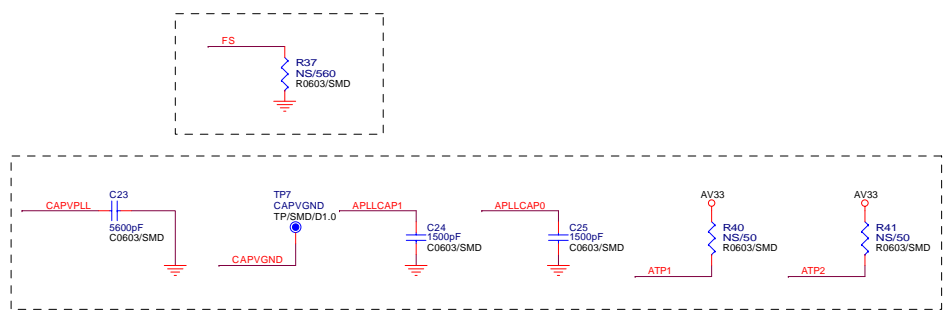
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MT5111 ASIC			
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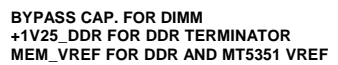
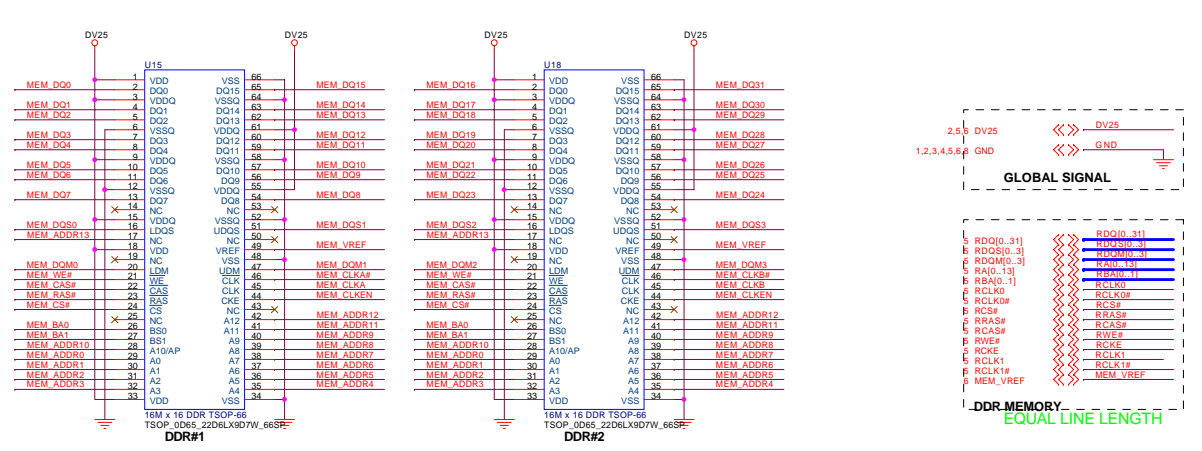


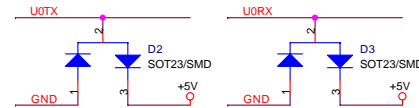
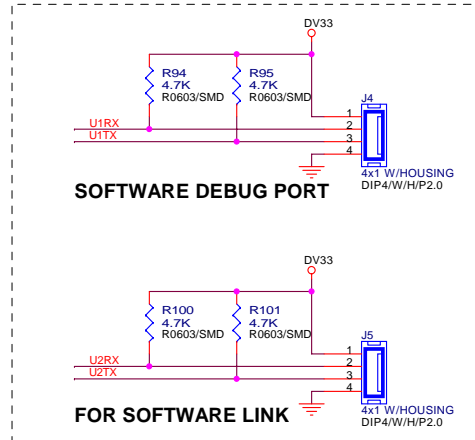
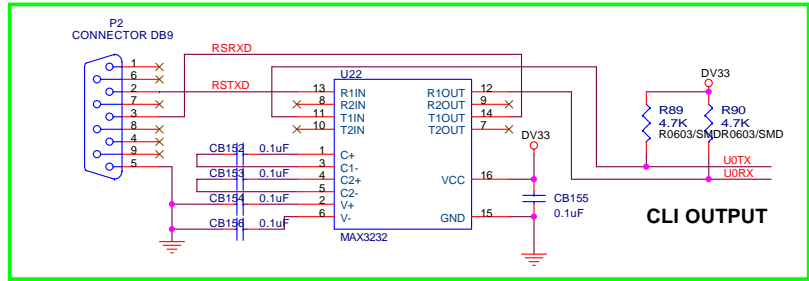


1P	+5V	<<>>	+5V
1,2,5,8	DV33	<<>>	DV33
2,8	AV33	<<>>	AV33
2,5,7	DV25	<<>>	DV25
2,5	DV12	<<>>	DV12
1,2,3,4,5,7,8	GND	<<>>	GND
8	OSDA0	<<>>	OSDA0
8	OSCL0	<<>>	OSCL0
4	OSDA_MST	<<>>	OSDA_MST
4	OSCL_MST	<<>>	OSCL_MST
GLOBAL SIGNAL			
6	FS	<<>>	FS
5	DVDDKP	<<>>	DVDDKP
2,6	AVDDBGKP	<<>>	AVDDBGKP
2,6	AVDDYK	<<>>	AVDDYK
2,6	AVDDRKP	<<>>	AVDDRKP
1	AVDD_DMPL0	<<>>	AVDD_DMPL0
2,6	AVDD_DMPL1	<<>>	AVDD_DMPL1
2,6	AVDD_VPLL	<<>>	AVDD_VPLL
2,6	AVDD_APLL1	<<>>	AVDD_APLL1
2,5	AVDD_APLL0	<<>>	AVDD_APLL0
6	CAPVPLL	<<>>	CAPVPLL
6	CAPV_GND	<<>>	CAPV_GND
6	APLLCAP1	<<>>	APLLCAP1
6	APLLCAP0	<<>>	APLLCAP0
6	ATP1	<<>>	ATP1
6	ATP2	<<>>	ATP2
ANALOG PART			
7	MEM_VREF	<<>>	MEM_VREF
5	RVREF	<<>>	RVREF
5	OPWM0	<<>>	OPWM0
5	XTALI	<<>>	XTALI
5	XTALO	<<>>	XTALO
5	VCX00	<<>>	VCX00
5	U2CTS	<<>>	U2CTS
5	OIRI	<<>>	OIRI

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Title			
MT5351 PERIPHERAL			
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	Title				<p align="center">NOR FLASH / JTAG / UART</p>			
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Main IC Specifications

- M13S128168A (ESMT)
2M x 16 Bit x 4 Banks Double Data Rate SDRAM
- MT5111CE
Single-Chip HDTV/CATV Demodulator
- MT5351
MT5351 is a DTV Backend Decoder SOC which support flexible transport demux, HD MPEG-2 video decoder, MPEG1,2, MP3, AC3 audio decoder, HDTV encoder. MT5351 is powered by ARM 926EJ with 16K I-Cache and 16K D-Cache. It can support 64Mb to 1Gb DDR DRAM devices with configurable 32/64 bit data bus interface.
- MT8202
MT8202G is a highly integrated Single-Chip for LCD TV supporting video input and output format up to HDTV. It includes 3D comb filter TV decoder to retrieve the best image from popular composite signals.
- MT8293
HDMI PanelLink Cinema Receiver
- R2S15102NP
Digital Power Amplifier R2S15102NP
- WM8776
24-bit, 192kHz Stereo CODEC with 5 Channel I/P Multiplexer

TFT LCD Preliminary Specification

MODEL NO.: V270B1 - L01

LCD TV Head Division	
AVP	郭振隆

QRA Dept.	TVHD / PDD		
	DDIII	DDII	DDI
Approval	Approval	Approval	Approval
陳永一	李汪洋	藍文錦	林文聰

LCD TV Marketing and Product Management Division	
Product Manager	陳立宜 謝芳宜

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REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver 1.0	Jun. 15,'05	All	All	Preliminary Specification was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

V270B1- L01 is a TFT Liquid Crystal Display module with 14-CCFL Backlight unit and 1ch-LVDS interface. The display diagonal is 27". This module supports 1366 x 768 WXGA format and can display true 16.7M colors(8-bits colors). The inverter module for backlight is built-in.

1.2 FEATURES

- Excellent brightness (550 nits)
- Ultra high contrast ratio (1000:1)
- Fast response time (8ms)
- High color saturation NTSC 75%
- WXGA (1366 x 768 pixels) resolution
- DE (Data Enable) only mode
- LVDS (Low Voltage Differential Signaling) interface
- Optimized response time for both 50/60 Hz frame rate
- Ultra wide viewing angle: 176(H)/176(V) (CR>20) Super MVA technology
- 180 degree rotation display option
- Low color shift function option
- Color reproduction (Nature color)

1.3 APPLICATION

- TFT LCD TVs
- High brightness, multi-media displays
-

1.4 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Active Area	596.259 (H) x 335.232 (V) (27" diagonal)	mm	(1)
Bezel Opening Area	603.22 (H) x 341.98 (V)	mm	
Driver Element	a-si TFT active matrix	-	
Pixel Number	1366 x R.G.B. x 768	pixel	
Pixel Pitch (Sub Pixel)	0.1460 (H) x 0.4365 (V)	mm	
Pixel Arrangement	RGB vertical stripe	-	
Display Colors	16.7M	color	
Display Operation Mode	Transmissive mode / Normally black	-	
Surface Treatment	Hardness : 3H, Haze : 40% Anti-reflective coating < 2% reflection	-	

1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	636.85	637.55	638.25	mm	
	Vertical(V)	379.1	379.8	380.5	mm	
	Depth(D)	33.9	35.4	36.9	mm	To PCB cover
	Depth(D)	39.2	40.7	42.2	mm	To inverter cover
Weight		3700	4000	4300	g	

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T _{ST}	-20	+60	°C	(1)
Operating Ambient Temperature	T _{OP}	0	+50	°C	(1), (2)
Shock (Non-Operating)	S _{NOP}	-	50	G	(3), (5)
Vibration (Non-Operating)	V _{NOP}	-	1.0	G	(4), (5)

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. (Ta ≤ 40 °C).

(b) Wet-bulb temperature should be 39 °C Max. (Ta > 40 °C).

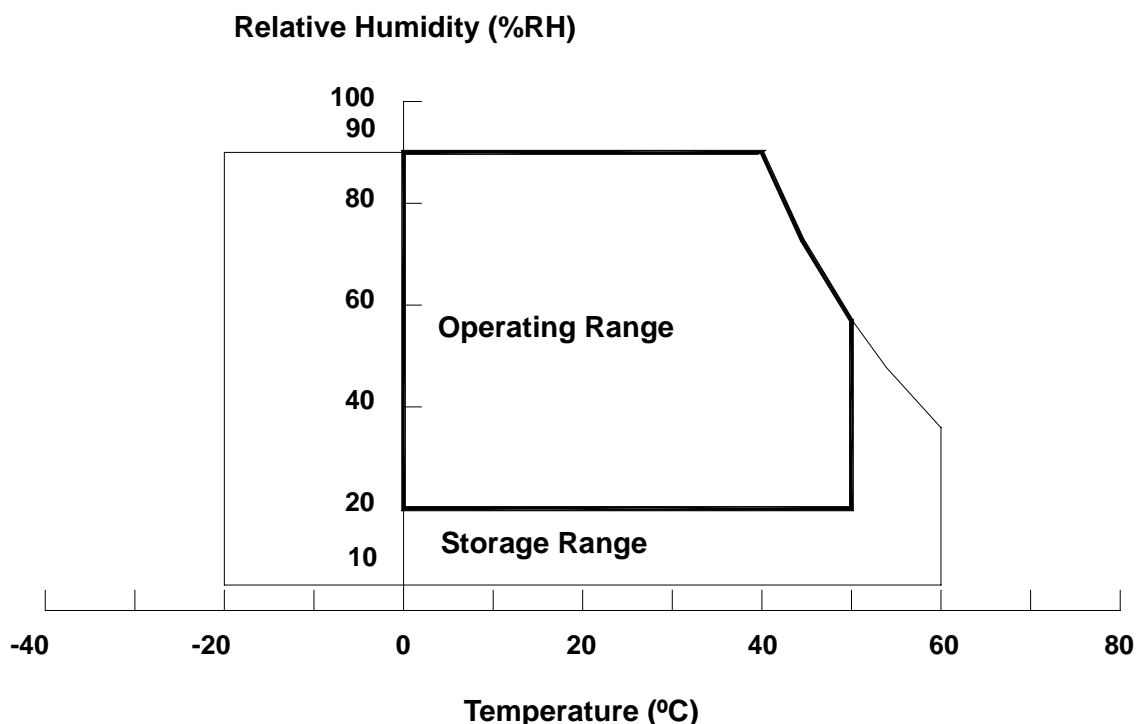
(c) No condensation.

Note (2) The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 60 °C with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 60 °C. The range of operating temperature may degrade in case of improper thermal management in final product design.

Note (3) 11 ms, half sine wave, 1 time for ± X, ± Y, ± Z.

Note (4) 10 ~ 500 Hz, 10 min, 1 time each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.



2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V _{CC}	-0.3	6.0	V	(1)
Input Signal Voltage	V _{IN}	-0.3	3.6	V	

2.2.2 BACKLIGHT UNIT

Item	Symbol	Test Condition	Min.	Type	Max.	Unit	Note
Lamp Voltage	V _W	Ta = 25	-	-	3000	V _{RMS}	
Power Supply Voltage	V _{BL}	-	0	-	30	V	(1)
Control Signal Level	-	-	-0.3	-	7	V	(1), (3)

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Functional operation should be restricted to the conditions described under normal operating conditions.

Note (2) No moisture condensation or freezing.

Note (3) The control signals includes Backlight On/Off Control, Internal PWM Control, External PWM Control and Internal/External PWM Selection.

3. ELECTRICAL CHARACTERISTICS

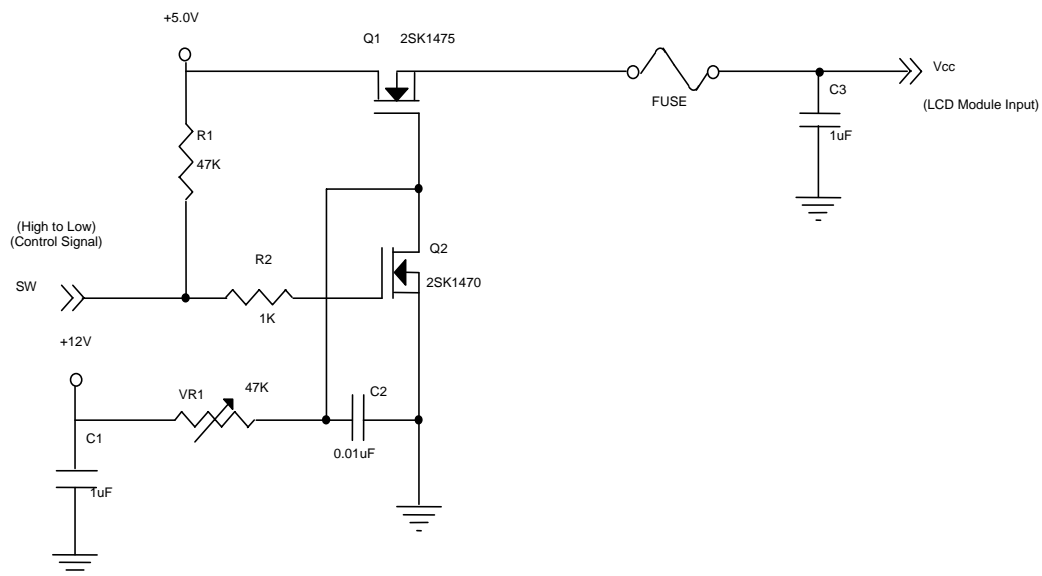
3.1 TFT LCD MODULE

Ta = 25 ± 2 °C

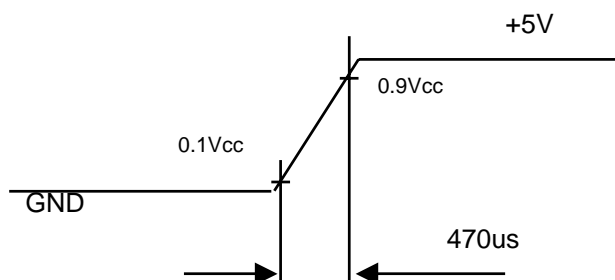
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V _{CC}	4.5	5.0	5.5	V	(1)
Power Supply Ripple Voltage		V _{RP}	-	-	150	mV	
Rush Current		I _{RUSH}	-	-	3.0	A	(2)
Power Supply Current	White	I _{CC}	-	1.8	-	A	(3)
	Black		-	1.2	-	A	
	Vertical Stripe		-	1.65	-	A	
LVDS Interface	Differential Input High Threshold Voltage	V _{LVTH}	-	-	+100	mV	
	Differential Input Low Threshold Voltage	V _{LVTL}	-100	-	-	mV	
	Common Input Voltage	V _{LVC}	1.125	1.25	1.375	V	
	Terminating Resistor	R _T		100		ohm	
CMOS interface	Input High Threshold Voltage	V _{IH}	2.7	-	3.3	V	
	Input Low Threshold Voltage	V _{IL}	0	-	0.7	V	

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:

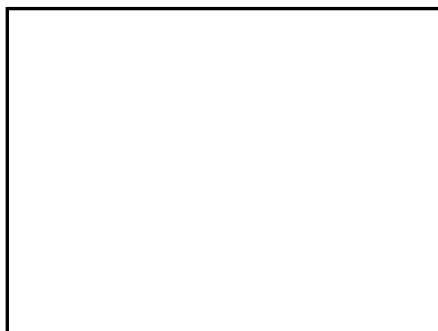


Vcc rising time is 470us



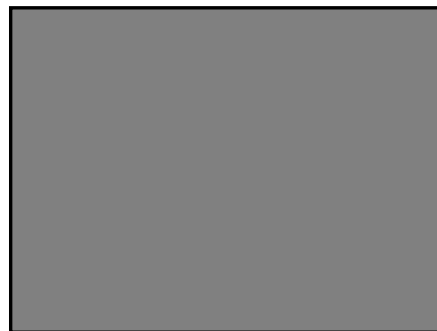
Note (3) The specified power supply current is under the conditions at $V_{CC} = 5\text{ V}$, $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$, $f_v = 60\text{ Hz}$, whereas a power dissipation check pattern below is displayed.

a. White Pattern



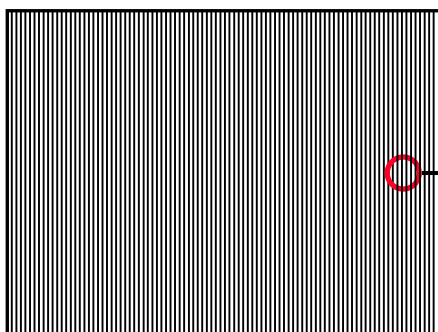
Active Area

b. Black Pattern

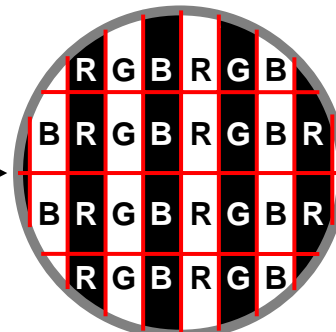


Active Area

c. Vertical Stripe Pattern



Active Area



3.2 BACKLIGHT INVERTER UNIT

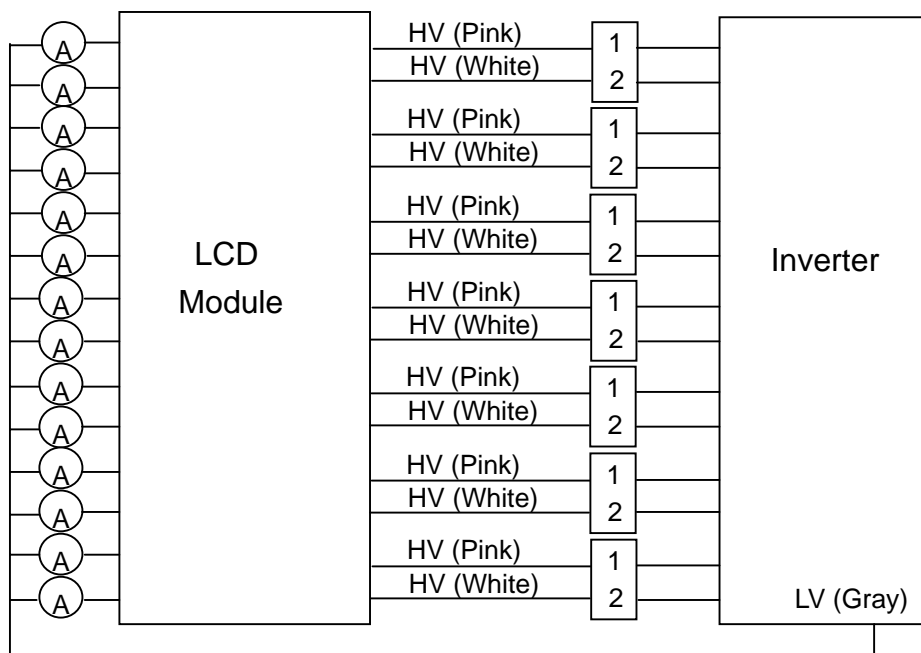
3.2.1 CCFL (Cold Cathode Fluorescent Lamp) CHARACTERISTICS ($T_a = 25 \pm 2\text{ }^{\circ}\text{C}$)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Voltage	V_W	-	1120	-	V_{RMS}	$I_L = 4.7\text{mA}$
Lamp Current	I_L	4.2	4.7	5.2	mA_{RMS}	(1)
Lamp Starting Voltage	V_S	-	-	1650	V_{RMS}	(2), $T_a = 0\text{ }^{\circ}\text{C}$
		-	-	1500	V_{RMS}	(2), $T_a = 25\text{ }^{\circ}\text{C}$
Operating Frequency	F_O	50	-	70	KHz	(3)
Lamp Life Time	L_{BL}	50,000	60,000	-	Hrs	(4)

3.2.2 INVERTER CHARACTERISTICS (Ta = 25 ± 2 °C)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Consumption	P _{BL}	-	92	-	W	(5), I _L = 4.7mA
Power Supply Voltage	V _{BL}	22.8	24	25.2	V _{DC}	
Power Supply Current	I _{BL}	-	3.8	-	A	Non Dimming
Input Ripple Noise	-	-	-	500	mV _{P-P}	V _{BL} = 22.8V
Backlight Turn on Voltage	V _{BS}	1790	-	-	V _{RMS}	Ta = 0 °C
		1200	-	-	V _{RMS}	Ta = 25 °C
Oscillating Frequency	F _W	53	56	59	kHz	
Dimming Frequency	F _B	150	160	170	Hz	
Minimum Duty Ratio	D _{MIN}	-	10	-	%	

Note (1) Lamp current is measured by utilizing high frequency current meters as shown below:



Note (2) The lamp starting voltage V_S should be applied to the lamp for more than 1 second under starting up duration. Otherwise the lamp could not be lighted on completed.

Note (3) The lamp frequency may produce interference with horizontal synchronous frequency from the display, and this may cause line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

Note (4) The life time of a lamp is defined as when the brightness is larger than 50% of its original value and the effective discharge length is longer than 80% of its original length (Effective discharge length is defined as an area that has equal to or more than 70% brightness compared to the brightness at the center point.) as the time in which it continues to operate under the condition $T_a = 25 \pm 2$ and $I_L = 4.2 \sim 5.2 \text{ mA}_{\text{RMS}}$.

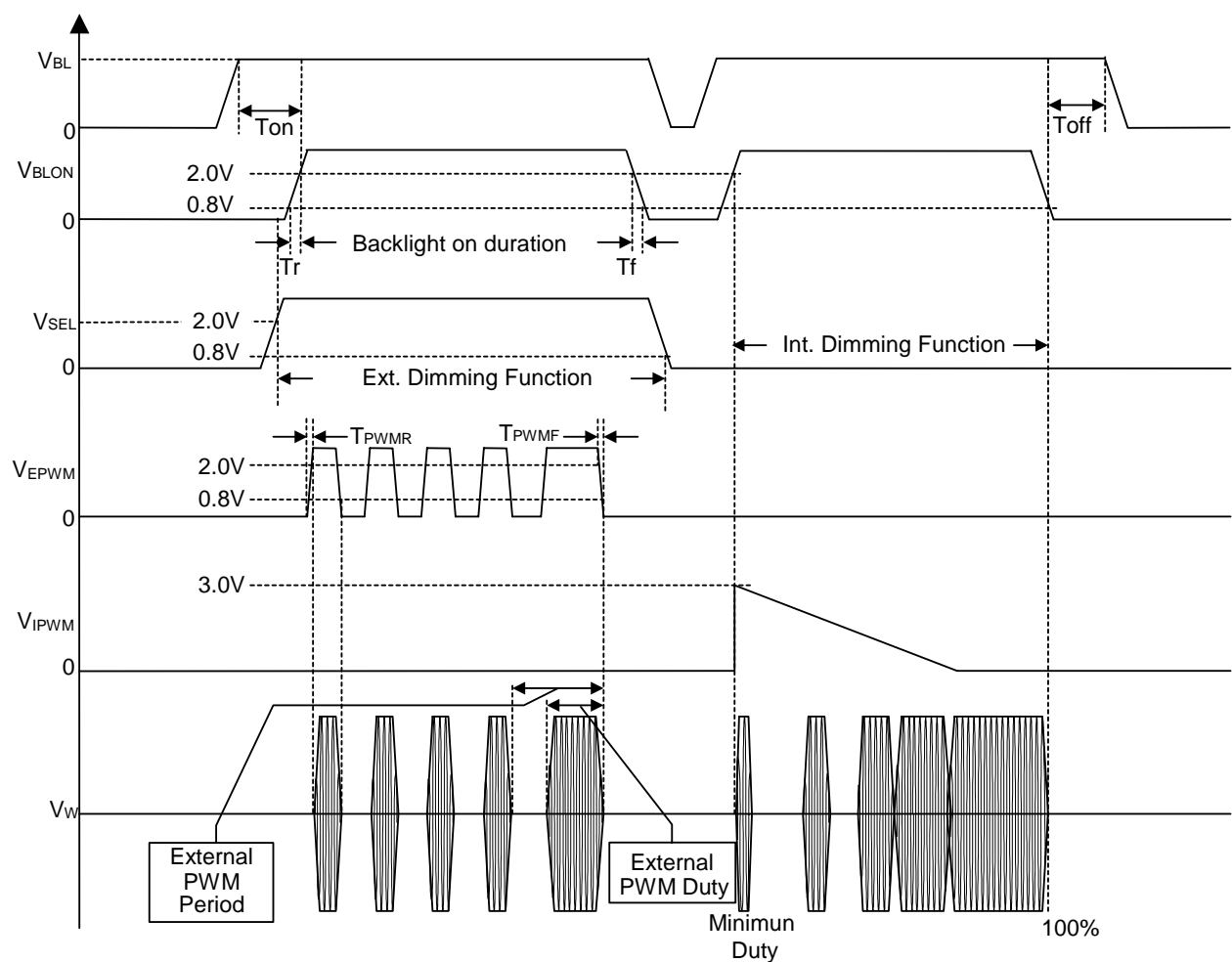
Note (5) The power supply capacity should be higher than the total inverter power consumption P_{BL} . Since the pulse width modulation (PWM) mode was applied for backlight dimming, the driving current changed as PWM duty on and off. The transient response of power supply should be considered for the changing loading when inverter dimming.

3.2.3 INVERTER INTERFACE CHARACTERISTICS

Item		Symbol	Test Condition	Min.	Typ.	Max.	Unit	Note
On/Off Control Voltage	ON	V_{BLON}	-	2.0	-	5.0	V	
	OFF		-	0	-	0.8	V	
Internal/External PWM Select Voltage	HI	V_{SEL}	-	2.0	-	5.0	V	
	LO		-	0	-	0.8	V	
Internal PWM Control Voltage	MAX	V_{IPWM}	$V_{\text{SEL}} = \text{L}$	-	-	3.0	V	minimum duty ratio
	MIN			-	0	-	V	maximum duty ratio
External PWM Control Voltage	HI	V_{EPWM}	$V_{\text{SEL}} = \text{H}$	2.0	-	5.0	V	duty on
	LO			0	-	0.8	V	duty off
Control Signal Rising Time		T_r	-	-	-	100	ms	
Control Signal Falling Time		T_f	-	-	-	100	ms	
PWM Signal Rising Time		T_{PWMR}	-	-	-	50	us	
PWM Signal Falling Time		T_{PWMF}	-	-	-	50	us	
Input impedance		R_{IN}	-	1	-	-	M	
BLON Delay Time		T_{on}	-	1	-	-	ms	
BLON Off Time		T_{off}	-	1	-	-	ms	

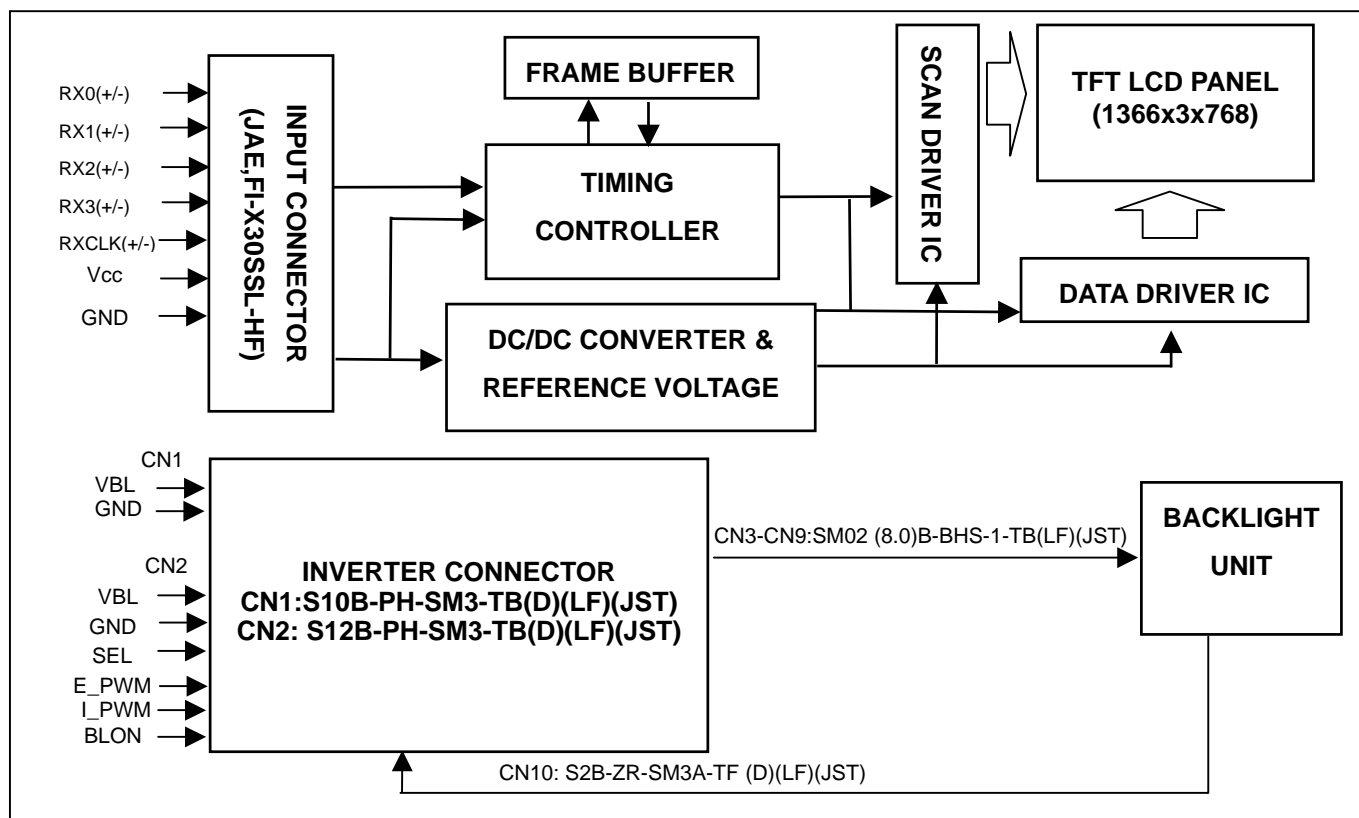
Note (1) The SEL signal should be valid before backlight turns on by BLON signal. It is inhibited to change the internal/external PWM selection (SEL) during backlight turn on period.

Note (2) The power sequence and control signal timing are shown as the following figure.



4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



5. INTERFACE PIN CONNECTION

5.1 TFT LCD MODULE

CNF1 Connector Pin Assignment

Pin No.	Symbol	Description	Note
1	GND	Ground	
2	RPF	Display Rotation	(3)
3	SELLVDS	Select LVDS data format	(5)
4	NC	No Connection	(2)
5	NC	No Connection	
6	ODSEL	Overdrive Lookup Table Selection	(4)
7	EN LCS	Low Color Shift	(6)
8	GND	Ground	
9	RX0-	Negative transmission data of pixel 0	
10	RX0+	Positive transmission data of pixel 0	
11	RX1-	Negative transmission data of pixel 1	
12	RX1+	Positive transmission data of pixel 1	
13	RX2-	Negative transmission data of pixel 2	
14	RX2+	Positive transmission data of pixel 2	
15	RXCLK-	Negative of clock	
16	RXCLK+	Positive of clock	
17	RX3-	Negative transmission data of pixel 3	
18	RX3+	Positive transmission data of pixel 3	
19	GND	Ground	
20	GND	Ground	
21	GND	Ground	
22	GND	Ground	
23	GND	Ground	
24	GND	Ground	
25	GND	Ground	
26	VCC	Power supply: +5V	
27	VCC	Power supply: +5V	
28	VCC	Power supply: +5V	
29	VCC	Power supply: +5V	
30	VCC	Power supply: +5V	

Note (1) Connector Part No.: FI-X30SSL-HF(JAE) or compatible

Note (2) Reserved for internal use. Left it open.

Note (3) Low : normal display (default), High : display with 180 degree rotation

Note (4) Overdrive lookup table selection. The Overdrive lookup table should be selected in accordance to the frame rate to optimize image quality.

ODSEL	Note
L	Lookup table was optimized for 60 Hz frame rate.
H	Lookup table was optimized for 50 Hz frame rate.

Note (5) Please refer to 5.5 LVDS INTERFACE (Page 17)

Note (6) Enable Low color shift function.

EN LCS	Note
L	Low color shift off
H	Low color shift on

5.2 BACKLIGHT UNIT

The pin configuration for the housing and leader wire is shown in the table below.

CN3-CN9 (Housing): BHR-03VS-1 (JST)

Pin No.	Symbol	Description	Wire Color
1	HV	High Voltage	Pink
2	HV	High Voltage	White

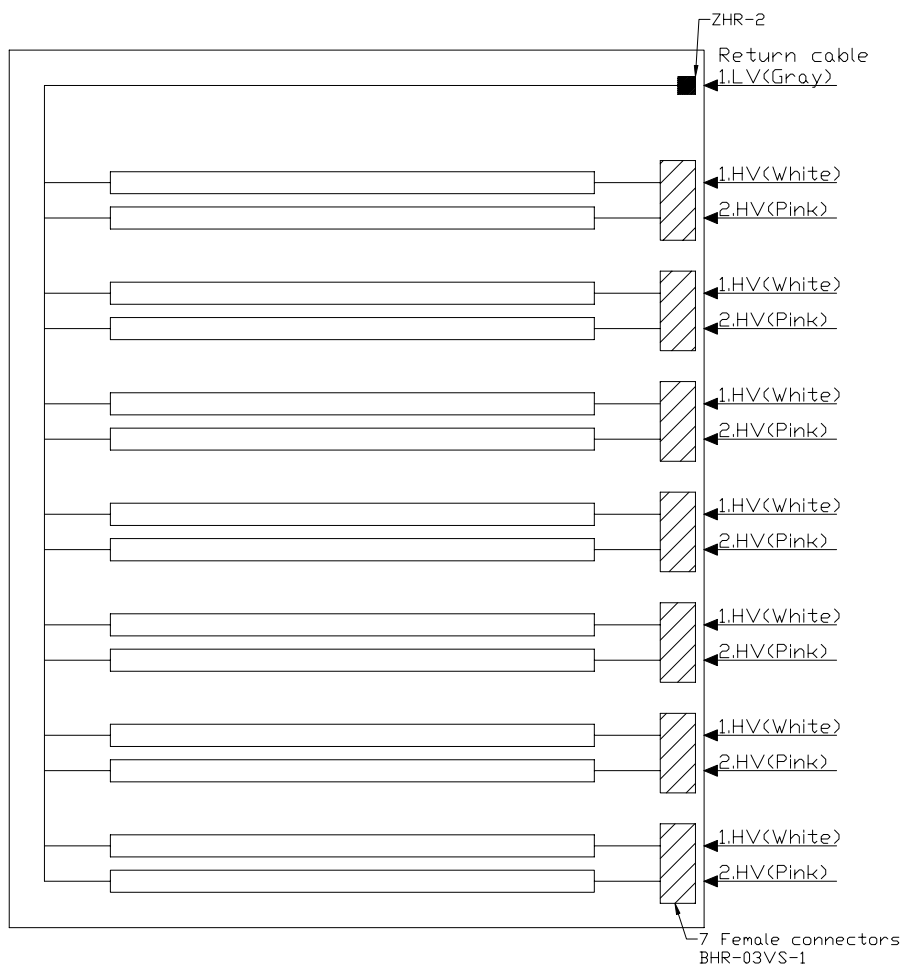
Note (1) The backlight interface housing for high voltage side is a model BHR-03VS-1, manufactured by JST.

The mating header on inverter part number is SM02(8.0)B-BHS-1-TB(LF) or equivalent.

CN10 (Housing): ZHR-2 (JST) or equivalent

Pin No.	Symbol	Description	Wire Color
1	LV	Low Voltage (+)	Gray
2	NC	No Connection	-

Note (2) The backlight interface housing and return cable for low voltage side is a model ZHR-2 , manufactured by JST or equivalent. The mating header on inverter part number is S2B-ZR-SM3A-TF(D)(LF) or equivalent.



5.3 INVERTER UNIT

CN1(Header):S10B-PH-SM3-TB(D)(LF)(JST) or equivalent.

Pin	Name	Description
1	VBL	+24V Power input
2		
3		
4		
5		
6	GND	Ground
7		
8		
9		
10		

CN2(Header): S12B-PH-SM3-TB(D)(LF)(JST) or equivalent.

Pin	Name	Description
1	VBL	+24V Power input
2		
3		
4		
5		
6	GND	Ground
7		
8		
9	SEL	Internal/external PWM selection High : external dimming Low : internal dimming
10	E_PWM	External PWM control signal E_PWM should be connected to low when internal PWM was selected (SEL = low).
11	I_PWM	Internal PWM control signal I_PWM should be connected to ground when external PWM was selected (SEL = high).
12	BLON	Backlight on/off control

CN3-CN9(Header): SM02(8.0)B-BHS-1-TB(LF)(JST) or equivalent

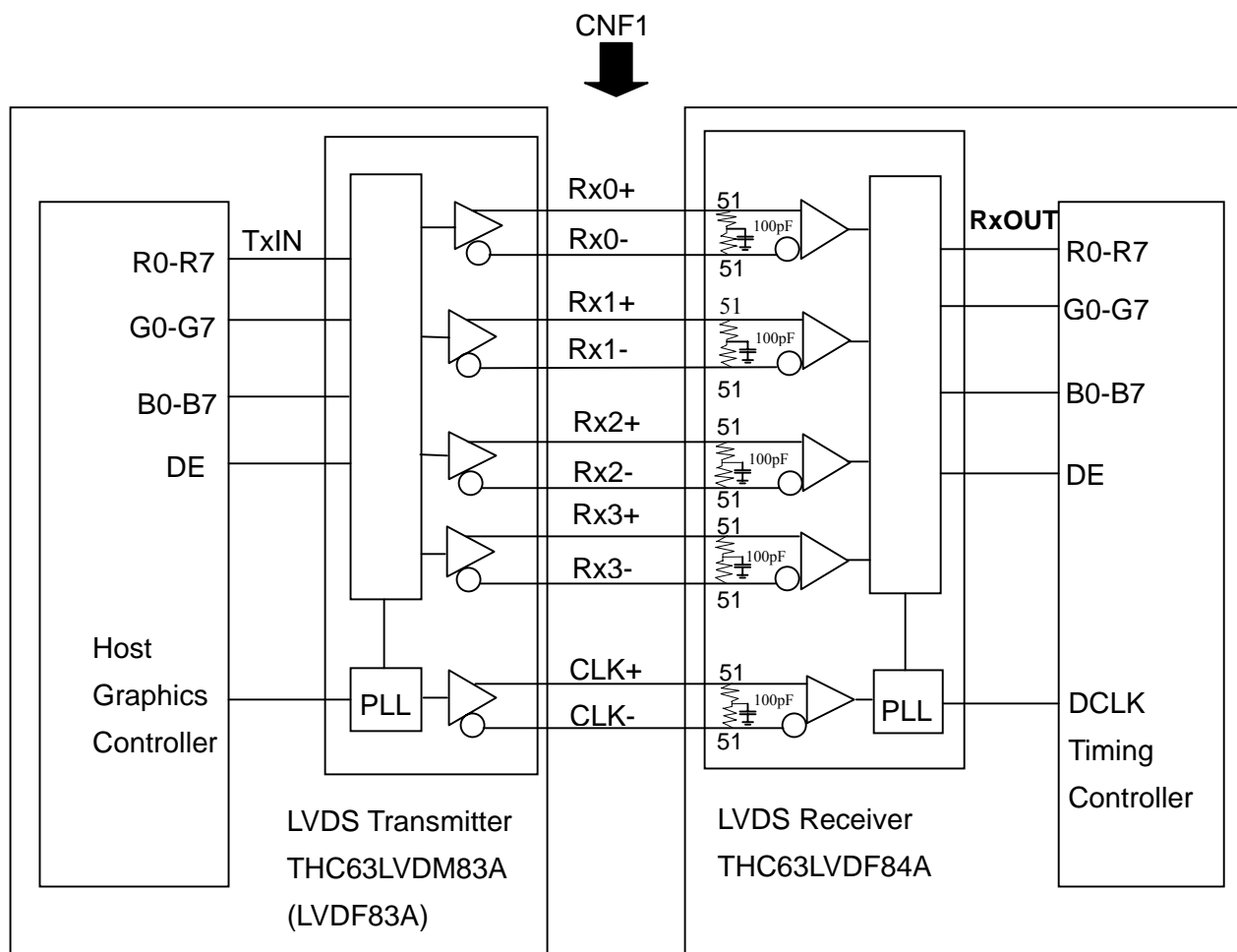
Pin	Name	Description
1	CCFL HOT	CCFL high voltage
2	CCFL HOT	CCFL high voltage

CN10(Header): S2B-ZR-SM3A-TF(D)(LF)(JST) or equivalent

Pin	Name	Description
1	CCFL COLD	CCFL low voltage
2	NC	-

Note (1) Floating of any control signal is not allowed.

5.4 BLOCK DIAGRAM OF INTERFACE



R0~R7 : Pixel R Data ,
G0~G7 : Pixel G Data ,
B0~B7 : Pixel B Data ,
DE : Data enable signal

Note (1) The system must have the transmitter to drive the module.

Note (2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is used differentially.

5.5 LVDS INTERFACE

	SIGNAL		TRANSMITTER THC63LVDM83A		INTERFACE CONNECTOR		RECEIVER THC63LVDF84A		TFT CONTROL INPUT	
	SELLVDS =L	SELLVDS =H	PIN	INPUT	Host	TFT-LCD	PIN	OUTPUT	SELLVDS =L	SELLVDS =H
24 bit	R0	R2	51	TxIN0	TA OUT0+	Rx 0+	27	Rx OUT0	R0	R2
	R1	R3	52	TxIN1			29	Rx OUT1	R1	R3
	R2	R4	54	TxIN2			30	Rx OUT2	R2	R4
	R3	R5	55	TxIN3			32	Rx OUT3	R3	R5
	R4	R6	56	TxIN4	TA OUT0-	Rx 0-	33	Rx OUT4	R4	R6
	R5	R7	3	TxIN6			35	Rx OUT6	R5	R7
	G0	G2	4	TxIN7			37	Rx OUT7	G0	G2
	G1	G3	6	TxIN8			38	Rx OUT8	G1	G3
	G2	G4	7	TxIN9	TA OUT1+	Rx 1+	39	Rx OUT9	G2	G4
	G3	G5	11	TxIN12			43	Rx OUT12	G3	G5
	G4	G6	12	TxIN13			45	Rx OUT13	G4	G6
	G5	G7	14	TxIN14			46	Rx OUT14	G5	G7
	B0	B2	15	TxIN15	TA OUT1-	Rx 1-	47	Rx OUT15	B0	B2
	B1	B3	19	TxIN18			51	Rx OUT18	B1	B3
	B2	B4	20	TxIN19			53	Rx OUT19	B2	B4
	B3	B5	22	TxIN20			54	Rx OUT20	B3	B5
	B4	B6	23	TxIN21	TA OUT2+	Rx 2+	55	Rx OUT21	B4	B6
	B5	B7	24	TxIN22			1	Rx OUT22	B5	B7
	DE	DE	30	TxIN26			6	Rx OUT26	DE	DE
	R6	R0	50	TxIN27	TA OUT2-	Rx 2-	7	Rx OUT27	R6	R0
	R7	R1	2	TxIN5			34	Rx OUT5	R7	R1
	G6	G0	8	TxIN10			41	Rx OUT10	G6	G0
	G7	G1	10	TxIN11			42	Rx OUT11	G7	G1
	B6	B0	16	TxIN16	TA OUT3+	Rx 3+	49	Rx OUT16	B6	B0
	B7	B1	18	TxIN17			50	Rx OUT17	B7	B1
	RSVD 1	RSVD 1	25	TxIN23			2	Rx OUT23	NC	NC
	RSVD 2	RSVD 2	27	TxIN24	TA OUT3-	Rx 3-	3	Rx OUT24	NC	NC
	RSVD 3	RSVD 3	28	TxIN25			5	Rx OUT25	NC	NC
		DCLK	31	TxCLK IN	TxCLK OUT+	RxCLK IN+	26	RxCLK OUT	DCLK	
					TxCLK OUT-	RxCLK IN-				

R0~R7: Pixel R Data (7; MSB, 0; LSB)

G0~G7: Pixel G Data (7; MSB, 0; LSB)

B0~B7: Pixel B Data (7; MSB, 0; LSB)

DE: Data enable signal

Notes(1) RSVD(reserved)pins on the transmitter shall be “H” or “L”.

5.6 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

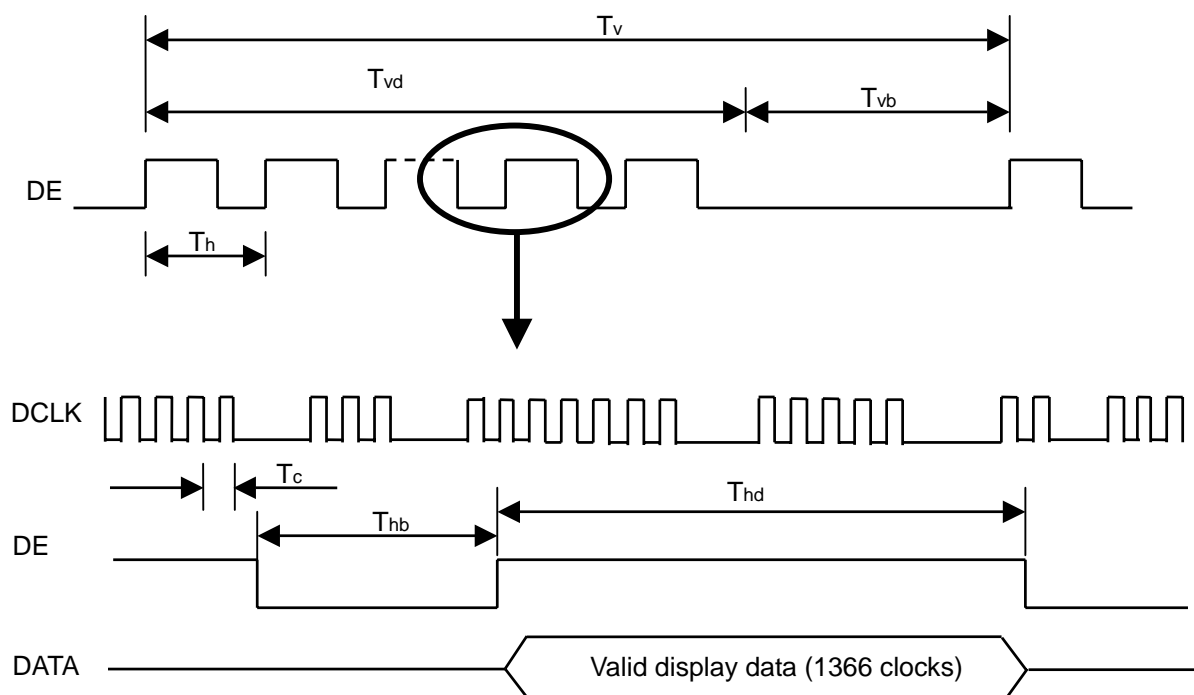
The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Receiver Clock	Frequency	1/Tc	60	86	88	MHz	
	Input cycle to cycle jitter	Trcl	-	-	200	ps	
LVDS Receiver Data	Setup Time	Tlvsu	600	-	-	ps	
	Hold Time	Tlvhd	600	-	-	ps	
Vertical Active Display Term	Frame Rate	Fr5	47	50	53	Hz	(2)
		Fr6	57	60	63	Hz	
	Total	Tv	770	795	888	Th	Tv=Tvd+Tvb
	Display	Tvd	768	768	768	Th	-
	Blank	Tvb	2	27	120	Th	-
Horizontal Active Display Term	Total	Th	1436	1798	1936	Tc	Th=Thd+Thb
	Display	Thd	1366	1366	1366	Tc	-
	Blank	Thb	70	432	570	Tc	-

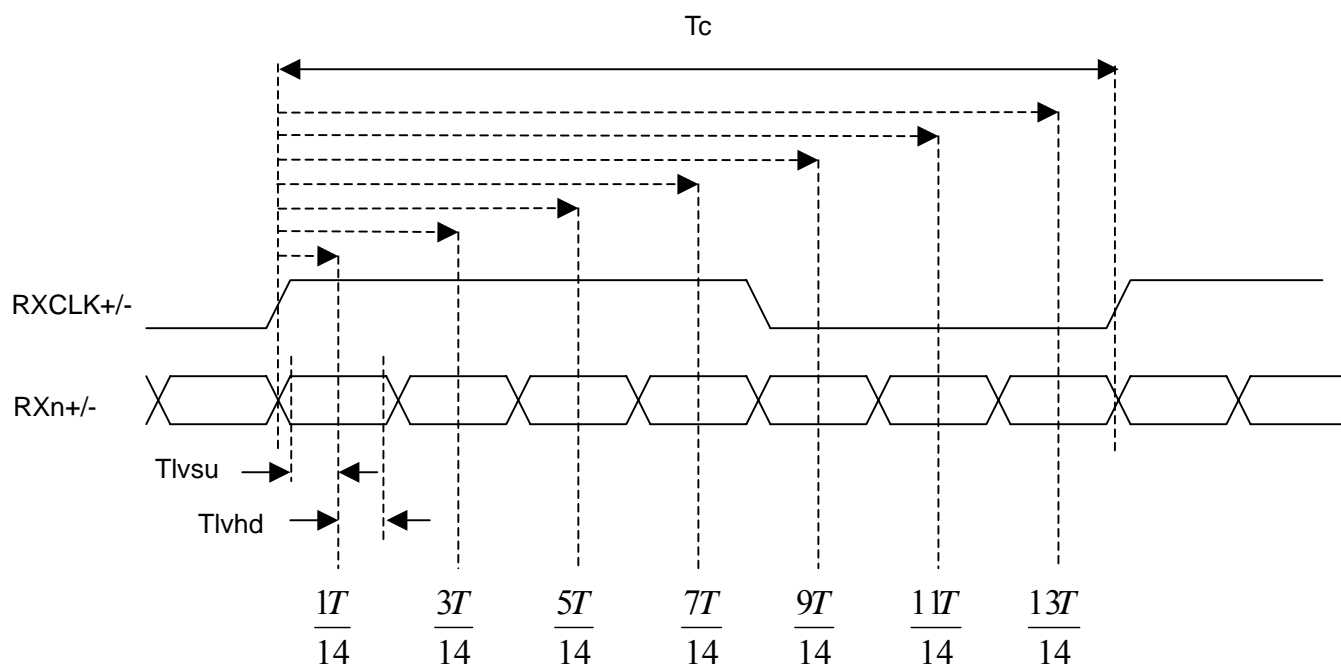
Note (1) Since this module is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this module would operate abnormally.

(2) Please refer to 5.1 for detail information.

INPUT SIGNAL TIMING DIAGRAM

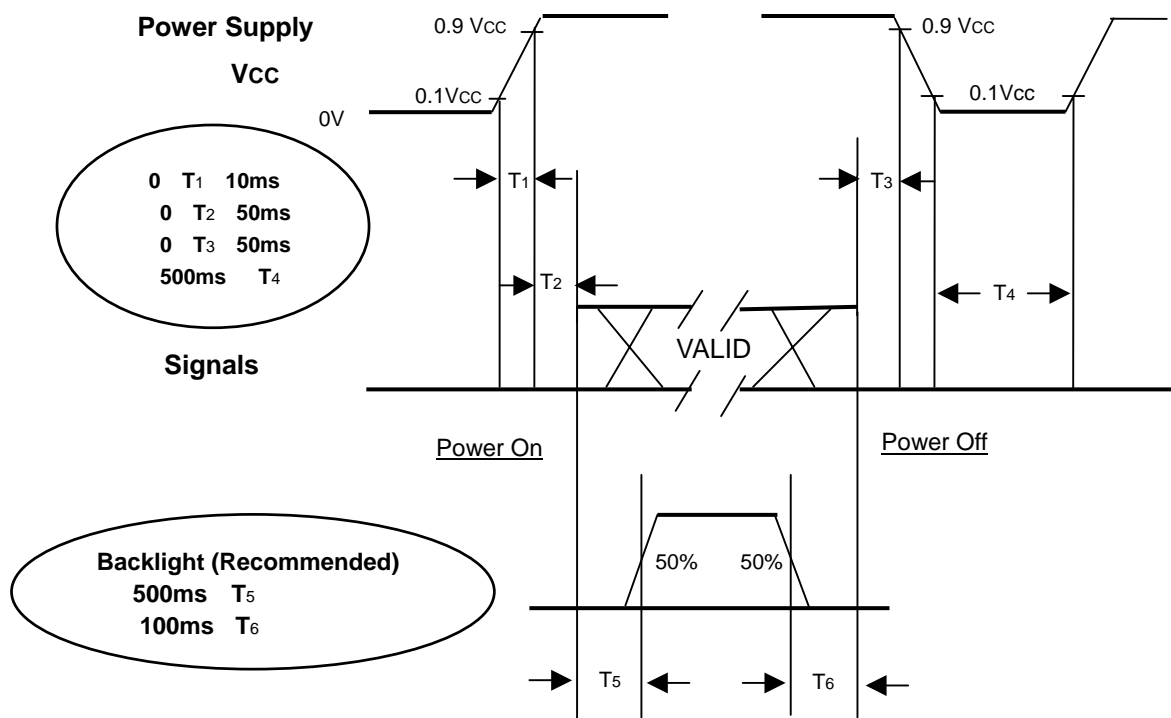


LVDS RECEIVER INTERFACE TIMING DIAGRAM



6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Power ON/OFF Sequence

Note (1) The supply voltage of the external system for the module input should follow the definition of Vcc.

Note (2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.

Note (3) In case of Vcc is in off level, please keep the level of input signals on the low or high impedance.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V _{CC}	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Lamp Current	I _L	4.7 ± 0.5	mA
Oscillating Frequency (Inverter)	F _W	56 ± 3	KHz

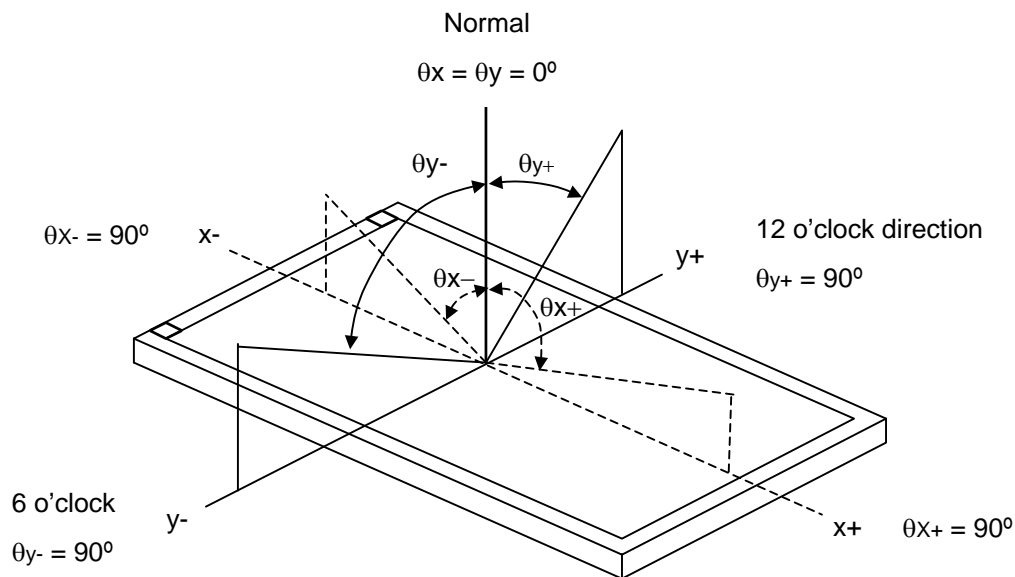
7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle		(1000)		-	(2)
Response Time		Gray to gray average			(8)		ms	(3)
Center Luminance of White		L _c			(550)		cd/m ²	(4)
White Variation		δW				(1.3)	-	(7)
Cross Talk		CT				(4)	%	(5)
Color Chromaticity	Red	R _x			(0.652)		-	(6)
		R _y			(0.331)		-	
	Green	G _x			(0.275)		-	
		G _y			(0.597)		-	
	Blue	B _x			(0.143)		-	
		B _y			(0.063)		-	
	White	W _x			(0.285)		Target	
		W _y			(0.293)			
Color Gamut		CG			(75)		%	NTSC
Viewing Angle	Horizontal	θ _{x+}	CR≥20		(88)		Deg.	(1)
		θ _{x-}			(88)			
	Vertical	θ _{y+}			(88)			
		θ _{y-}			(88)			

Note (1) Definition of Viewing Angle (θ_x , θ_y):

Viewing angles are measured by EZ-Contrast 160R (Eldim)



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

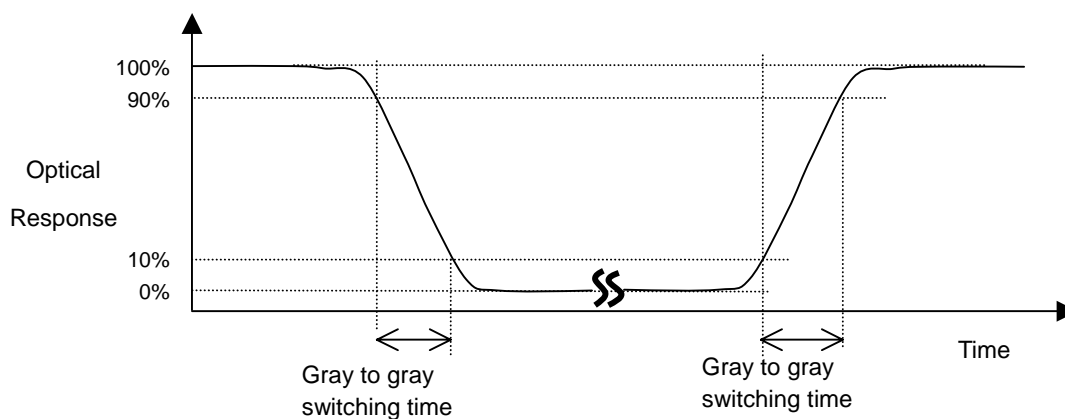
L_{255} : Luminance of gray level 255

L_0 : Luminance of gray level 0

$$\text{CR} = \text{CR} (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (7).

Note (3) Definition of Gray to Gray Switching Time :



The driving signal means the signal of gray level 0, 63, 127, 191, 255.

Gray to gray average time means the average switching time of gray level 0, 63, 127, 191, 255 to each other .

Note (4) Definition of Luminance of White (L_C , L_{AVE}):

Measure the luminance of gray level 255 at center point and 5 points

$$L_C = L(5)$$

$$L_{AVE} = [L(1) + L(2) + L(3) + L(4) + L(5)] / 5$$

$L(x)$ is corresponding to the luminance of the point X at the figure in Note (7).

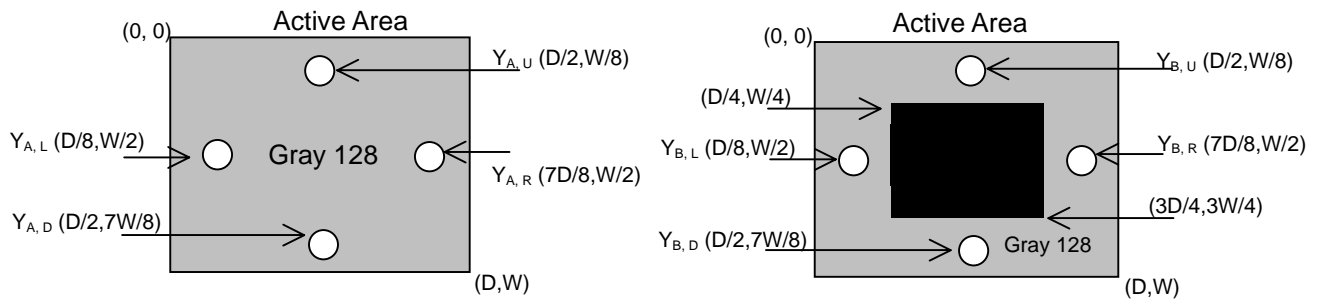
Note (5) Definition of Cross Talk (CT):

$$CT = |Y_B - Y_A| / Y_A \times 100 (\%)$$

Where:

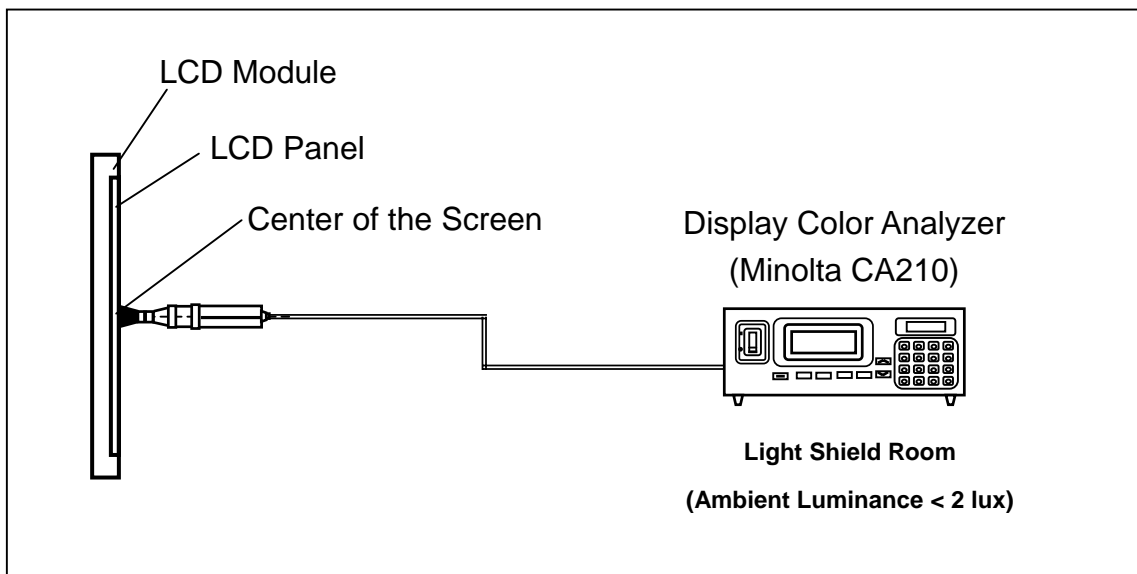
Y_A = Luminance of measured location without gray level 0 pattern (cd/m^2)

Y_B = Luminance of measured location with gray level 0 pattern (cd/m^2)



Note (6) Measurement Setup:

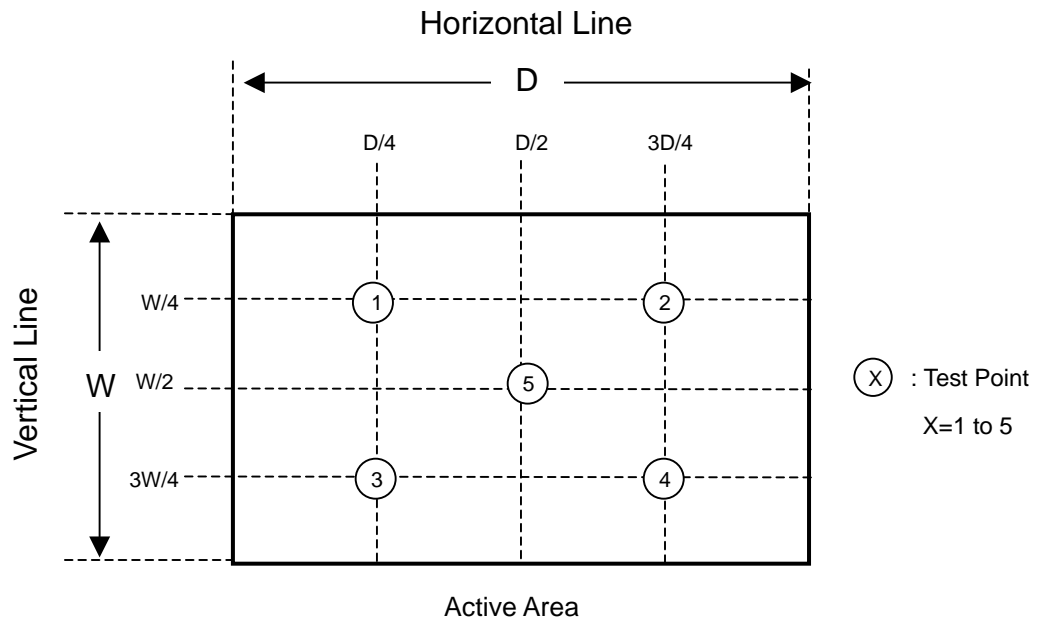
The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



Note (7) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

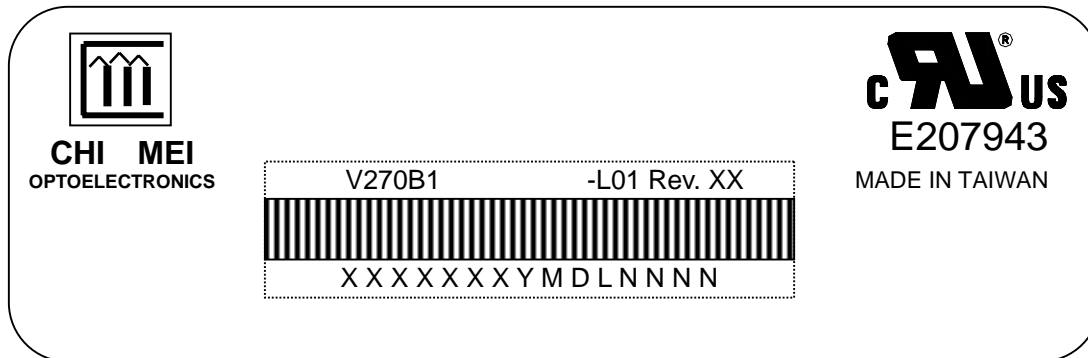
$$\delta W = \text{Maximum } [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum } [L(1), L(2), L(3), L(4), L(5)]$$



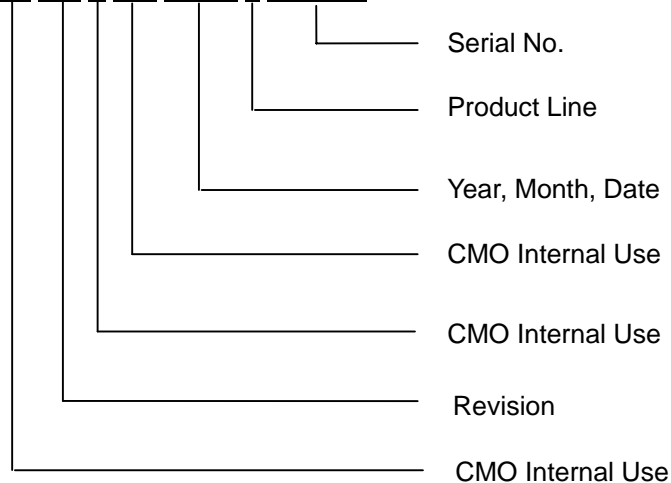
8. DEFINITION OF LABELS

8.1 CMO MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



- (a) Model Name: V270B1-L01
- (b) Revision: Rev. XX, for example: A0, A1... B1, B2... or C1, C2...etc.
- (c) Serial ID: XXXXXXYMDLNNNN



Serial ID includes the information as below:

- (a) Manufactured Date: Year: 1~9, for 2001~2009
 Month: 1~9, A~C, for Jan. ~ Dec.
 Day: 1~9, A~Y, for 1st to 31st, exclude I ,O, and U.
- (b) Revision Code: Cover all the change
- (c) Serial No.: Manufacturing sequence of product
- (d) Product Line: 1 -> Line1, 2 -> Line 2, ...etc.

9. PACKAGING

9.1 PACKING SPECIFICATIONS

- (1) 4 LCD TV modules / 1 Box
- (2) Box dimensions : 742(L) X 327 (W) X 510 (H)
- (3) Weight : approximately 19Kg (4 modules per box)

9.2 PACKING METHOD

Figures 9-1 and 9-2 are the packing method

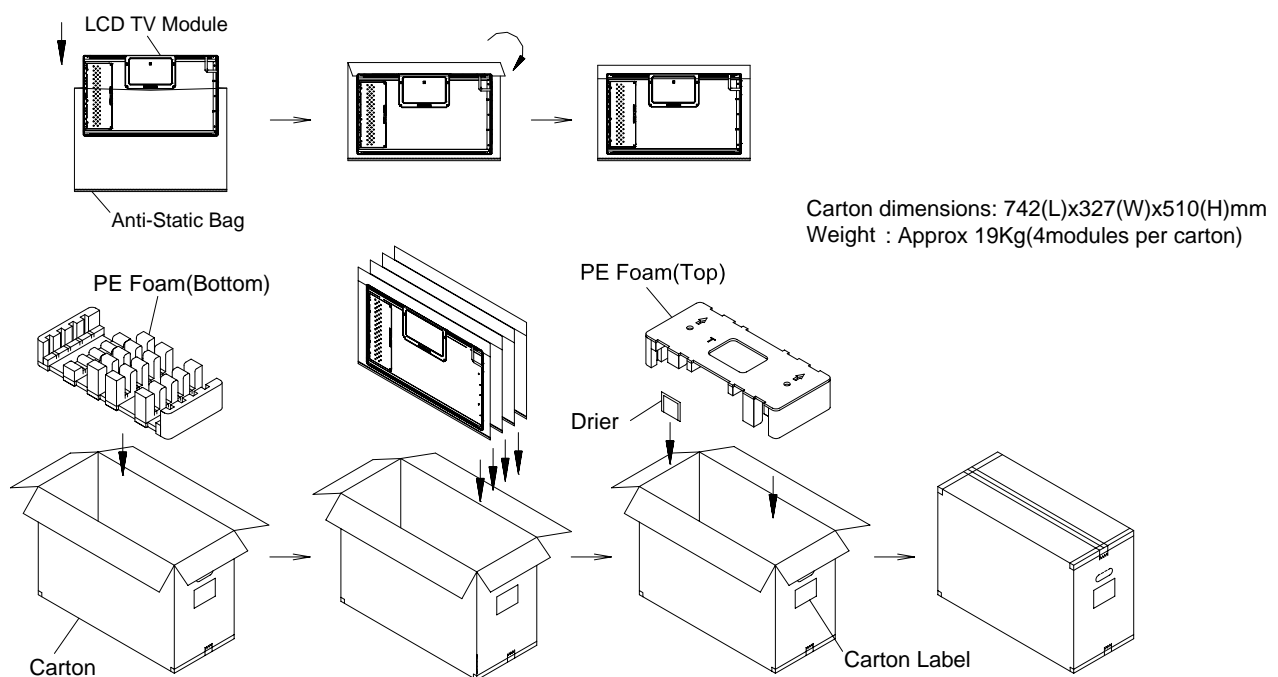


Figure.9-1 packing method

Corner Protector:L1020*50mm*50mm

Pallet:L1100*W1100*H135mm

Corrugated Fiberboard:L1100*W1100mm

Pallet Stack:L1100*W1100*H1160mm

Gross:168kg

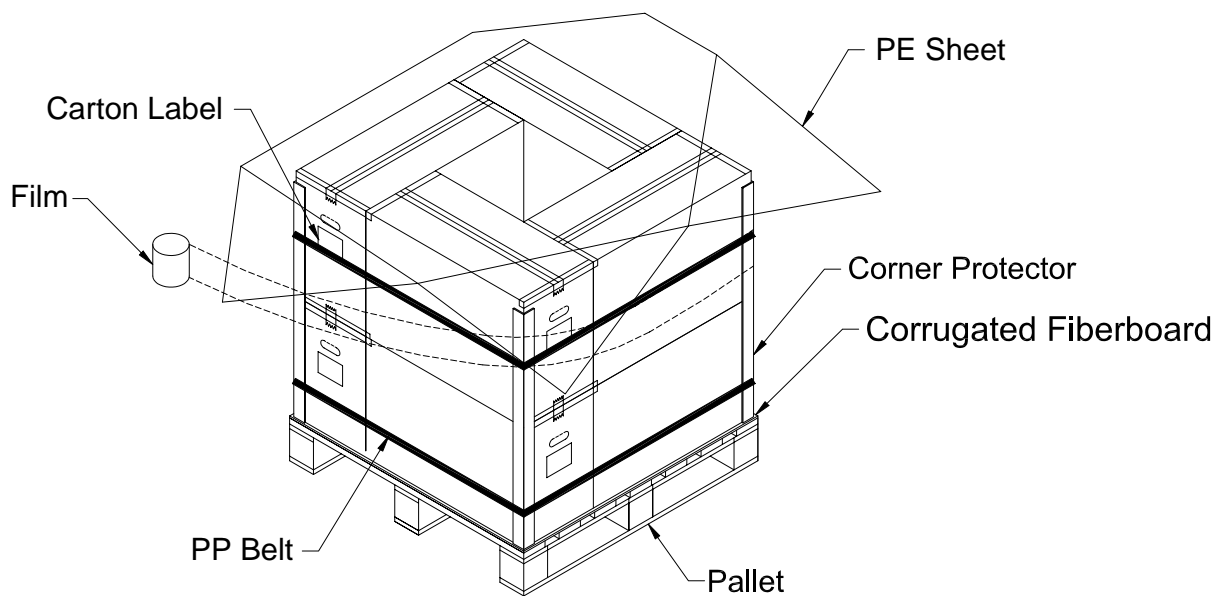


Figure. 9-2 packing method

10. PRECAUTIONS

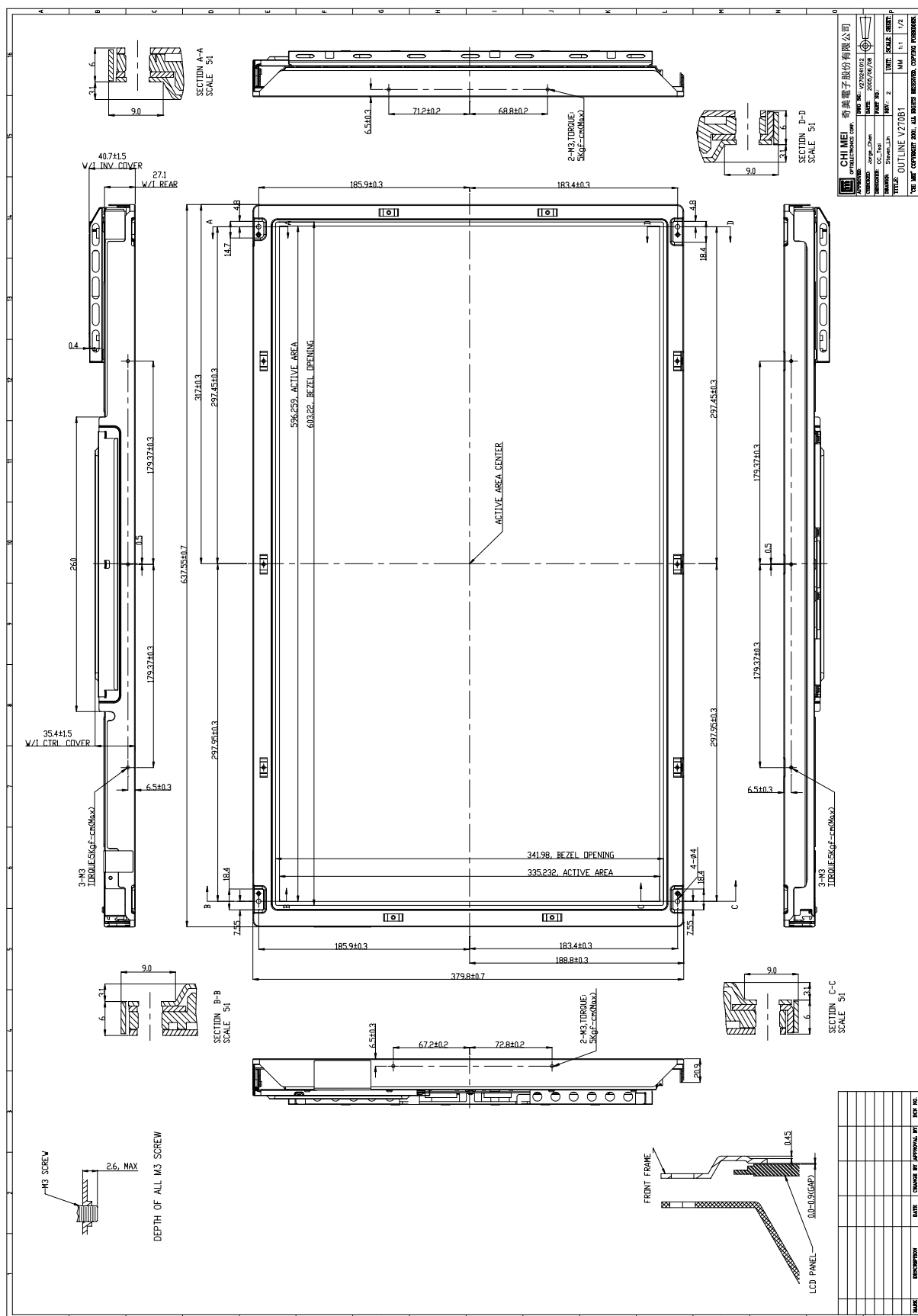
10.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) It is recommended to assemble or to install a module into the user's system in clean working areas.
The dust and oil may cause electrical short or worsen the polarizer.
- (3) Do not apply pressure or impulse to the module to prevent the damage of LCD panel and backlight.
- (4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- (5) Do not plug in or pull out the I/F connector while the module is in operation.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) Moisture can easily penetrate into LCD module and may cause the damage during operation.
- (9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD modules in the specified storage conditions.
- (10) When ambient temperature is lower than 10°C, the display quality might be reduced. For example, the response time will become slow, and the starting voltage of CCFL will be higher than that of room temperature.

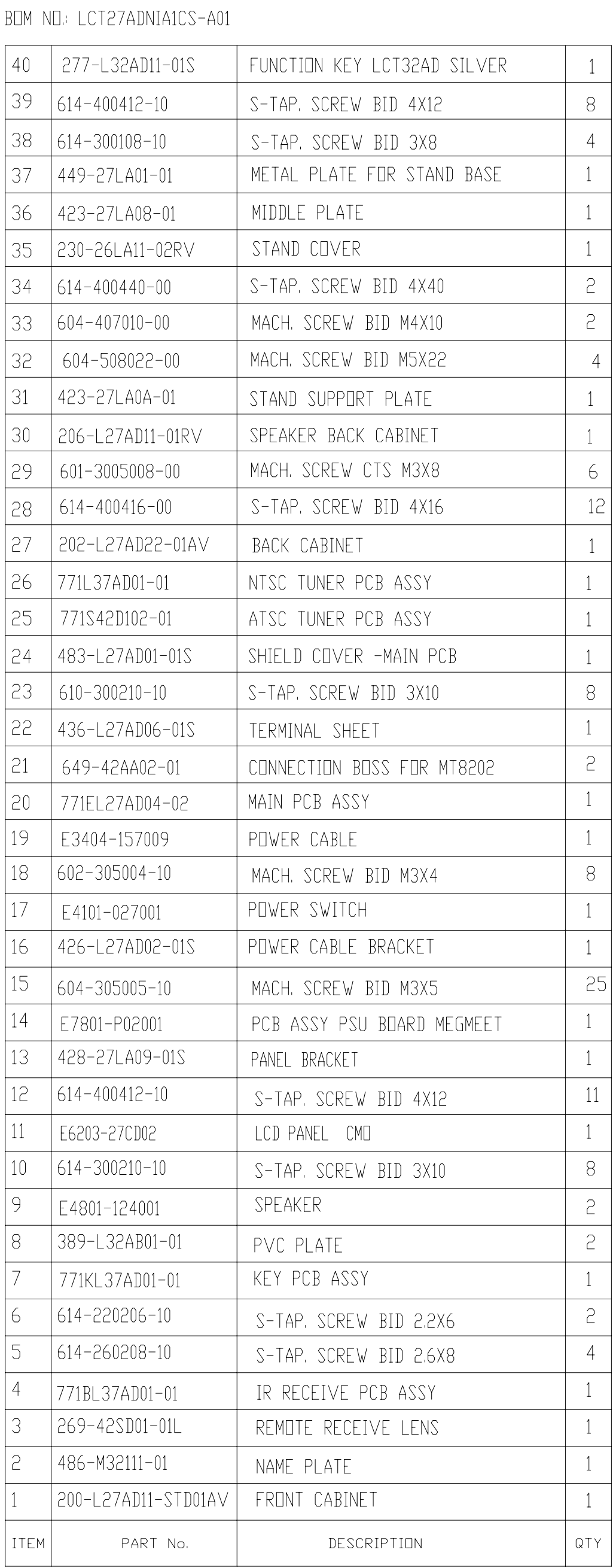
10.2 SAFETY PRECAUTIONS


- (1) The startup voltage of a backlight is over 1000 Volts. It may cause an electrical shock while assembling with the inverter. Do not disassemble the module or insert anything into the backlight unit.
- (2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (3) After the module's end of life, it is not harmful in case of normal operation and storage.

11. MECHANICAL CHARACTERISTICS



DWG.Rev.	ZONE	DESCRIPTION	DATE	REVISOR
0		RELEASE	19-Apr-06	tzl



DRAWN						TOLERANCE UNLESS OTHERWISE SPECIFIED	KAWA ELECTRONIC R & D CENTRE	TITLE EXPLODE VIEW		
CHECKED						0 - 30 ± 0.10 >30-100 ± 0.20 >100 ± 0.30 ANGULAR ± 0.3° UNIT : mm		MATL.	MODEL NO. LC2785TA	
APPRD.							FINISH	A3	PART NO. EXP-L27AD03-D1	DWG. NO. L27ADXP3
3rd ANGLE PROJECTION									SCALE 1:1	SHEET 1 OF 1

Spare Part List for LCT2785TA

Item	Part Number	Part Description	Usage / unit	Unit	Key/Spare
	LCT27ADNIA1CS-A01	AKAI LCD27"(LCT2785TA) S-MT8202 + CMO AC120/60HZ USA SILVER			
1>	510-L27AD03-01AKA	CARTON BOX AKAI LCT2785TA (MTK-8202+CMO PANEL)	1	Piece	K
2>	580-L27ADHS-TU03L	IB E FOR AKAI LCT27AD USA CMO(V270B1-L01) S-MTK8202	1	Piece	K
3>	E7501-056102	REMOTE CONTROL K001 "AKAI" 44KEYS MT8202 LCD32"/27" (W/O DVD) USA SILVER/BLACK	1	SET	K
4>	771EL27AD04-02	PCB ASSY MAIN S-MT8202 FOR 27LCD CMO	1	SET	K
5>	771L37AD01-01	NTSC TUNER PCB ASSY FOR LCD37	1	SET	K
6>	771S42D102-01	ATSC TUNER PCB ASSY	1	SET	K
7>	200-L27AD11-STD01AV	CABINET FRONT SILVER/BLACK AKAI LCT2701TD MT8205 A	1	Piece	S
8>	202-L27AD22-01AV	BACK CABINET W/O DVD W/O CARD READER LCT27AD	1	Piece	S
9>	206-L27AD11-01RV	SPEAKER CABINET AKAI LCT2701TD(MT8205) R	1	Piece	S
10>	269-42SD01-01L	REMOTE RECEIVE LENS	1	Piece	S
11>	277-L32AD11-01S	FUNCTION KEY SIL(MATERIAL:BLACK) LCT32SD	1	Piece	S
12>	300-L27AD05-02C	POLYFOAM BOTTOM	1	Piece	S
13>	300-L27AD06-02C	POLYFOAM TOP	1	Piece	S
14>	310-111404-07V	POLYBAG 11"X14"X0.04 FV	1	Piece	S
15>	310-383550-07V	POLYBAG LAMIFILM 38"X35"X0.5MM	1	Piece	S
16>	389-L32AB01-01	PVC SHEET L32AB	2	Piece	S
17>	426-L27AD02-01S	POWER CABLE CLIP L27AD S	1	Piece	S
18>	436-L27AD06-01S	TERMINAL SHEET MT8202 W/O DVD LCT27AD	1	Piece	S
19>	483-L27AD01-01S	SHIELD COVER-MAIN PCB	1	Piece	S
20>	486-M32111-01	NAME PLATE M AKAI	1	Piece	S
21>	522-421D01-01	MASKING PAPER	1	Piece	S
22>	563-119-	SERIAL NO. LABEL	1	Piece	S
23>	568-P46T02-02	WARNING LB ENG 42SF NIL	1	Piece	S
24>	579-42D102-09	SERIAL NO/BAR CODE LABEL 42D1	1	Piece	S
25>	579-42D105-01	PROTECTIVE EARTH LABEL FOR ESA 42TD1	1	Piece	S
26>	579-L27AD02-01APA	UPC LABEL OF C/B AKAI LCT2785TA	2	Piece	S
27>	579-L27AD09-01	CAUTION LABEL ENG AKAI	1	Piece	S
28>	590-L27AD01-04	WARRANTY CARD AKAI LCT2785TA	1	Piece	S
29>	593-L27AD01-03	INSERTION CARD AKAI LCT2785TA/LCT3285TA	1	Piece	S
30>	E3404-157009	AC CORD UL 1.88M FOR LCD32 MT8202	1	Piece	S
31>	E3421-925127	WIRE ASSY TJC3-2Y L860 SPK-R MT8202	1	Piece	S
32>	E3421-925129	WIRE ASSY 10P/2.5 FOR MT8202 27" POWER 9V/12V	1	Piece	S

Spare Part List for LCT2785TA

Item	Part Number	Part Description	Usage / unit	Unit	Key/Spare
33>	E3421-925130	WIRE ASSY 1H3.96-2KN6 20 L180 2P FOR LCD32"/27"	2	Piece	S
34>	E3421-925133	WIRE ASSY TJC3-3Y L650 SPK-L MT8202	1	Piece	S
35>	E3421-926119	WIRE ASSY P2.0 8P L=215 TV/SIF	1	Piece	S
36>	E3421-926125	WIRE ASSY P2.5 4P/4P L400MM AMP24V EMI MT8202	1	Piece	S
37>	E3461-064036	WIRE ASSY INVERTER 12P2.0+8P2.5+3P2.0 L450MM L650MM MT8202	1	Piece	S
38>	E3461-064038	WIRE ASSY P2.5 7P/7P L400MM 5V STANBY POWER MT8202 FOR 27"/32" LCD	1	Piece	S
39>	E3471-000044	WIRE WS SHIELD WIRE FOR 32LCD COMBO MICO KEY 13P/8P+5P	1	Piece	S
40>	E3471-000057	WIRE WS SHIELD WIRE 27" L300MM MICO CMO MT8202 LVDS NEW	1	Piece	S
41>	E4101-027001	SWITCH POW MR-22-N2BB-F2 ROCKET	1	Piece	S
42>	E4801-124001	SPEAKER 8 OHM 10W D3" YD78-1	2	Piece	S
43>	E6203-27CD02	DISPLAY LCD 27" CMO V270B1-L01 1366X768 1000:1 HIGH CONTRAST	1	Piece	S
44>	E7301-010002	BATTERY AAA R03P1.5V <2>	2	Piece	S
45>	E7801-P02001	PCB ASSY PSU BOARD MEGMEET MT168 FOR 27LCD AC110-240V OUTPUT 12V/8V/24V 200W	1	SET	S
46>	734-L27AD03-01	ELLIPSE PLASTIC BASE ASSY W/O LOGO W/O PACKING SILVER	1	SET	S
47>	771BL37AD01-01	IR RECEIVE PCB ASSY FOR LCT37AD	1	SET	S
48>	771KL37AD01-01	KEY PCB ASSY FOR LCT37AD	1	SET	S